no. 1

Premier Issue

# The User's Guide™

## To CP/M® Systems and Software

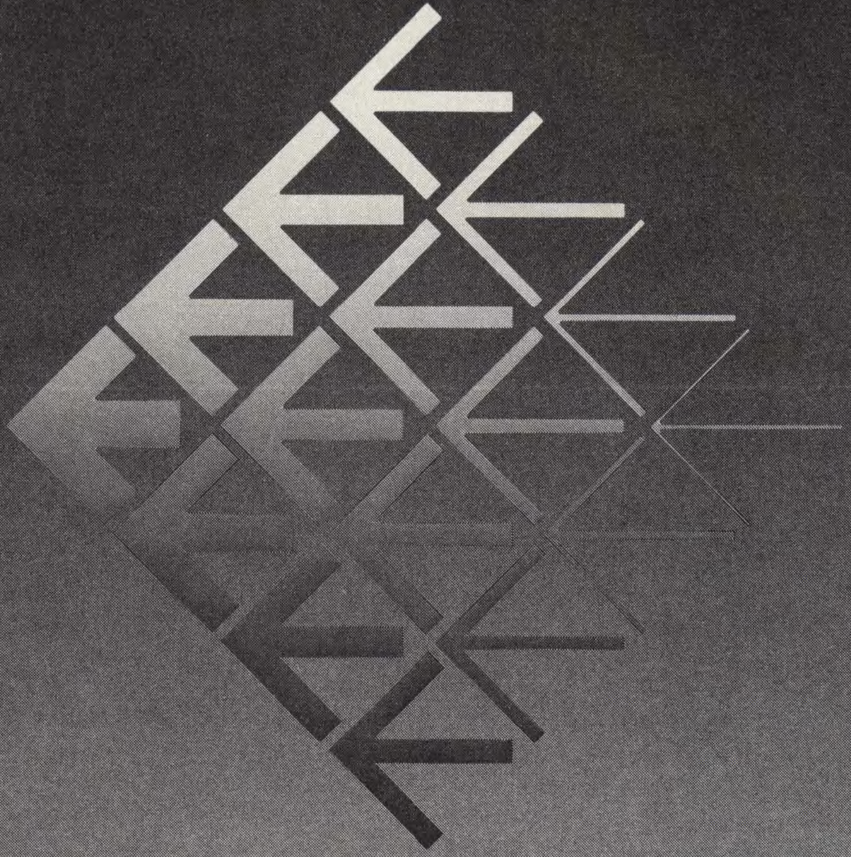
$4

The World of CP/M

Using CompuServe

Disaster Prevention & Recovery

# The Systems Plus Approach



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# The User's Guide™

*To CP/M® Systems and Software*

## About The Cover

This issue's cover is an enhanced version of an "apostolic" page from the fabulous Book of Kells, an Irish illuminated manuscript of the 9th Century. This book is on display in Dublin in two seperate locations. The Books of Matthew and Mark are in the Georgian reading library above the book store on Trinity College Campus, and the books of Luke and John are on display at the National Museum a few blocks from Trinity.

The Book of Kells contains pigments imported from Syria and Afghanistan long before Marco Polo was said to have opened the trade to the Orient. The blue is lapis lazuli, and the ochre and yellow pigments are found only in the area around Jerusalem. These pigments indicate that 8th Century Irish monks conducted trade with the holy land, probably by sea.

This title page is an illustration of John, the author of the book of Revelations. The Book of Kells, like the Lindisfarne Gospels and many other dark age illuminated manuscripts, are loaded with submerged codes. The keys to deciphering these codes are found in the front of the book in a section called the Canon (much like a computer program heading). This is usually a section which enables the reader to read the texts in differential order to arrive at different meaning or a clarification.

This same technique was carried out in the Kabballah, and in many pre-Christian Gnostic texts such as the book of Jubalies and the Enochion. In this sense they operated very much like *user's guides* to the culture and its religions.

H.H.

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*The User's Guide* Volume 1, Number 1 October/November, 1982. (ISSN applied for) is published every two months by TUG, Inc., 117 Ware Rd., Woodside, CA 94062. Application to mail at second-class postage rates is pending at Woodside- Redwood City CA.

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Send all requests to The Editors, Box 3050, Stanford, CA 94305. Phototypesetting by George Graphics, San Francisco. Printed by TechnoWeb in San Jose.

SUBSCRIPTION INFORMATION:

Single copy price $4.00 ($5.50 sent first-class). Subscription for one year is: U.S. — $18 if payment accompanies order, $21 if subscription is billed. Add $10 for first-class delivery.

FOREIGN - $24 U.S. for one year (surface mail) if payment accompanies order, $29 U.S. if subscription is billed. Inquire about rates for airmail delivery outside the U.S.

Inquiries about bulk, retail sale, and group rates are encouraged. Address subscription inquiries to The User's Guide, Box 3050, Stanford, CA 94305. Allow 4-6 weeks for processing of order.

POSTMASTER: Please send address changes (Form 3579) to The User's Guide, Box 3050, Stanford CA 94305.

*Editorial...*

# A New Magazine For Computer Users

## *Covering CP/M Systems and Software*

*How can these things be?*
— The Gospel According to St. John 3:9

This issue is the first of a new kind of magazine, and a new medium for documentation of the highest quality.

*The User's Guide* may be the only magazine in the computing, or in *any* consumer interest, that offers detailed lengthy tutorials (sometimes over twenty pages) on using specific products. And in computing, there is such a need for good documentation!

We chose to focus on CP/M systems because there are so many different computers that run CP/M. As CP/M proliferates (over 500,000 systems now operating), there is a potential for something unique to occur in the computer industry: people who are not programmers may begin to understand CP/M, and thereby know how to use *many different computers* at the same time, rather than know only one specific system.

The immense popularity of CP/M (every "mass market" personal computer now runs CP/M, as well as nearly every business desktop computer system) is due largely to its familiar set of commands and application programs.

CP/M has been called the "Rosetta Stone" and the "Holy Grail" of microcomputing. For beginners, a knowledge of CP/M suddenly unlocks the mysteries of the computer and makes available a library of "holy texts" (distinctive application programs). Newcomers become "enlightened" to the magic of using a computer in a variety of applications.

To programmers, CP/M provides the "Rosetta Stone" key to using several different languages to write a variety of different applications, all in different styles. To system packagers, CP/M offers the capability to include, within one modern desktop computer system, a mix of proven programs from older and larger systems.

CP/M is really a software medium to allow standard application programs to run on a variety of different computers. As an "operating system" (its technical name), it is fair, not so friendly as hoped, but simple and versatile.

As a medium for software exchange, it is excellent. Important also is its ability to function as a medium for *data* exchange. People who use computers for word processing first discovered the advantage of having a CP/M system: the ability to transmit "files" (collections of data, such as a chapter of a book) to other, almost completely different systems, and use the files on those systems. As magazine writers and producers, we recognized the advantage of having our electronic library stored in the CP/M format. We can write and edit articles electronically, and transmit them to a typesetting service, without ever printing them on paper. We can also use our files on other CP/M systems. Why not cover CP/M? It is the system of choice for us, and for many other writers and publishers.

Like the Book of Kells Canon, this first issue provides a CP/M tutorial that acts as a key to decipher future issues. This issue introduces the world of CP/M and some of its terminology, and lays a foundation with useful habits and tips on preventive maintenance.

The issue also introduces one activity that is gaining in importance with users: data communications. CompuServe is a service you can call by phone and use with your home or office computer. Such information services will soon provide electronic banking, "tele-shopping," reservations by computer, research data bases, etc. They may revolutionize the way we bank, shop, plan trips and do business.

In future issues we intend to cover typical personal computer applications such as word processing, financial modeling and forecasting, preparing taxes, performing multiple printing and mailing list operations, and managing a data base.

We want to provide the best documentation in the industry, on a timely basis that covers the best software as soon as it is available.

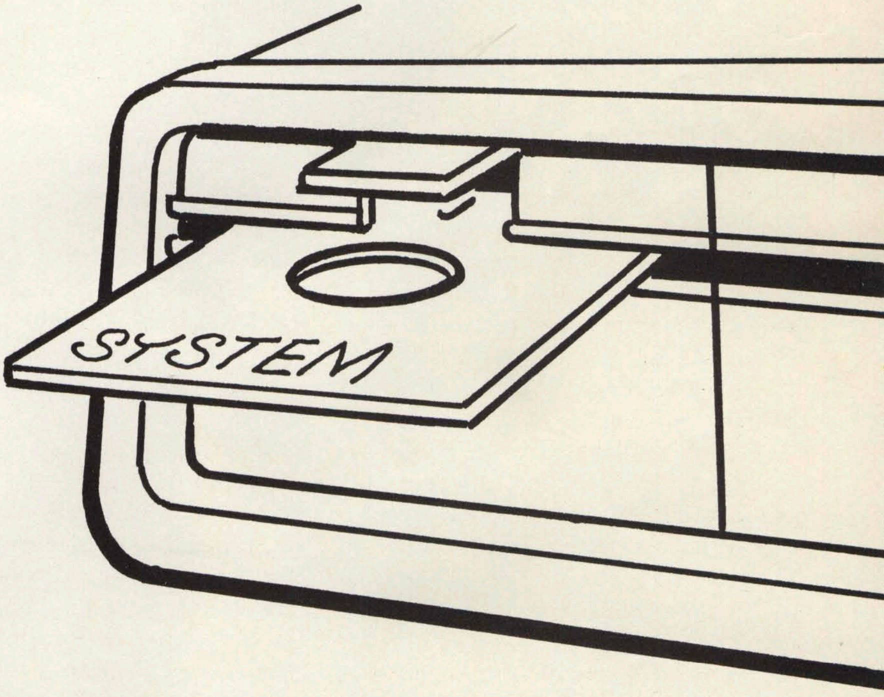
We want readers to know they can always reach for *The User's Guide* when they need to know how to use a CP/M system or an application program. We want subscribers to learn as much as possible over the next few years, to become more knowledgeable about their investment in computing tools. We are proving that such computing tools are useful in producing this magazine and in servicing our subscribers and advertisers.

*The User's Guide* will provide articles that show you how to use personal computers in interesting and useful applications. You need not know anything about computers to gain useful knowledge about computing from this publication. We'd like to answer your questions, and point the way for you to solve your problems, for one thing is certain: this industry has a long way to go before it can make computers that can explain themselves.

# The World of CP/M

*A basic introduction to using small computers*

*We promise to bring you, in every issue, at least one article for beginners that introduces the topic covered in that issue. In this issue, the topic is CP/M itself.*



This magazine is devoted to a type of system known as a "CP/M" system. What is a "CP/M?" It stands for Control Program for Microcomputers, and it runs on many different brands of desktop and portable computers. In fact, it is probably the most widely used program in the world.

CP/M was created by Gary Kildall, who later founded Digital Research to support it. Digital Research (Pacific Grove, CA) supplies CP/M to manufacturers and system packagers, who package the system with the computer hardware and provide it to retailers.

It is usually supplied with your system, in the form of a master floppy disk to be inserted in the disk drive of your computer. For example, Xerox provides CP/M for its 820 computer on a Xerox 820 disk in the box with the 820, and Osborne Computer Corp. provides CP/M on an Osborne disk in the box with the Osborne 01 computer.

Some computer manufacturers do not supply CP/M, but CP/M is available for their computers. Radio Shack does not sell CP/M on a disk for its computers, but at least four other software distributors sell it (you must buy the Radio Shack computer first). The Apple II computer requires an extra add-on circuit board to run CP/M, and Apple does not supply these products, but you can get the special add-on board with CP/M from distributors, and it is easy to install.

### *The CP/M Advantage*

CP/M is an *operating system.* (That doesn't just mean that it *works* — it may not be "operating," but it is an operating system). Essentially it is the first (or one of the first) pieces of "software" to gain control of the computer (the "hardware").

You need such a thing, to get your computer working for you (rather than you working to *program it*). You need the system to be up and running before you can start running a useful application program.

Once you have CP/M, you can purchase additional programs that make your CP/M system a useful business or professional computer. Word processing, data base management, forecasting, budgeting and accounting programs are available for CP/M systems from many independent distributors. At last count there were over two thousand different application programs for CP/M systems. Nearly every application thought up for desktop computers is possible with a CP/M-type computer and an off-the- shelf CP/M application program.

The reason for this is simple: CP/M is a standard software system available to use with non-standard computers. Programs written for CP/M do not have to contain the actual code to operate the system. One program can be written for a "standard CP/M system" and then used in many different computers.

Another major advantage to using CP/M is the ability to transfer your data to a computer from a different manufacturer. Your business could purchase an IBM or Xerox computer running CP/M, and you could buy a portable Osborne computer running CP/M for use in your home or while traveling, and be able to exchange data between the different computers.

It is helpful to remember that computers recognize two types of information: *program instructions* and regular data. CP/M can store both kinds of information on the same disk, and the information is structured into *files* that are universally recognized by other CP/M systems. It is therefore possible to transfer any file of data, or any program (file of program instructions), from one system to another system where they can also be used.

CP/M systems can be programmed in a variety of computer languages (FORTRAN, Pascal, COBOL, BASIC, Forth, APL, Ada, etc.). Popular programs like WordStar, SpellGuard and SuperCalc were first introduced on CP/M systems. Note, however, that some systems *hide* CP/M from you — you never see it, you only see *menu* selections on your screen to choose from.

Although a CP/M application program will theoretically work in any CP/M system, most have to be slightly modified for specific display screens and printers. Most CP/M programs come equipped with installation programs that perform this modification for you. You simply select your specific display terminal or computer from the "menu" of selections that appears on your screen.

"CP/M compatibility" is all well and good, but can you actually transfer CP/M programs and data files to another computer? Over the phone, yes, or even directly through a cable, if you have the appropriate software *on both systems* (sometimes it has to be the *same program* on both systems). This is a topic to cover all by itself, and soon!

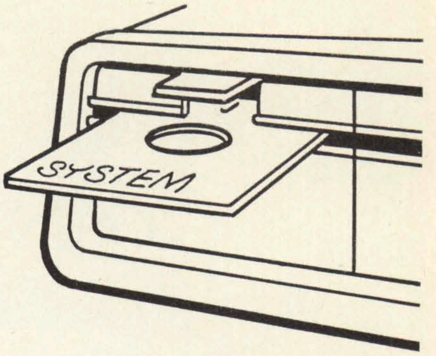
Can I use my disk in another CP/M system? Not until you've read about the horrors of...

### *The Disk Dilemma*

It would be easy to transfer data from one computer to another if both computers stored data *in the same format* on the ubiquitous floppy disk. However, we seem to have three types of disks: eight-inch (diameter), five-inch (actually five and a quarter), and the new three-inch disks.

Unfortunately, formats used for five-inch and three-inch disk systems are usually proprietary to the manufacturers. To buy software for your five-inch or three-inch disk system, the software must be supplied on the type of disk you are using *and in the same format*.

Most eight-inch disk systems that run CP/M offer the ability to use the CP/M standard disk format: the eight-inch single-density single sided disk (also known as the IBM 3740 format). If your data files are on CP/M single-density disks, you should be able to use those disks to transfer those files to another eight-inch disk CP/M system (the same disk should work in both systems).



Most eight-inch disk systems also offer the option of using a proprietary *double-density* format (twice as much data can fit in the same space). You should use the proprietary format for your working disks (to have more space for working), but you should use the single-density standard format for your archives.

By the way, you should keep archive disks. This is perhaps the most overlooked advantage to using computers: you can archive vast amounts of data on disk, and duplicate the disks (perhaps keeping the duplicates in a lead-lined safe), and thereby have a more secure and compact archive than you could ever have with a paper system. We actually carry the contents of two books and four magazines on a few disks in a briefcase.

### *Typical Small Computer System*

The newest small computers are complete desktop units that include a keyboard, display screen, and at least one floppy disk drive (usually two). A typical system has a printer and modem device attached to it by special cables. The printer may also have a "tractor feed" device for feeding continuous form paper.

Users who need a lot of disk storage can add more expensive hard disk subsystems to provide more "online" storage (disk space available while using the system, without having to replace a cartridge or disk).

Printers available with personal computers include the "letter quality" daisy-wheel or thimble-wheel printers (such as the Diablo HyType or the NEC Spinwriter), or the less expensive "dot matrix" printers (such as the popular Epson MX-80 or Centronics 747).

Modems are used for data communications over phone lines. Modems come in two types: acoustic couplers that connect to your telephone handset, or direct-connect modems that connect to the telephone line directly.

What is inside the small computer? There is always a device called the CPU, for *central processing unit*, which is driven by the operating system and its programs. This chip (usually from the Intel or Zilog family) is the traffic cop of the circuits, directing the flow of program instructions and data.

There is also an area of circuitry known as *internal memory*. The computer can "see" only the amount of program instructions and data that can fit into this region of internal memory, known as RAM (random access memory, also known as really active memory). To "see" any more program instructions and data, the computer must replace the stuff already in internal memory with new program instructions and data *from your disks*.

Therefore, and this is really all you need to know about RAM, you can use only programs that can fit into the region of memory offered by your computer system.

For example, if you have a "48K system," you cannot use a program that requires 56K of RAM. Most systems offer 64K of RAM (the standard amount for business and professional applications), because many CP/M application programs require more than 48K (the standard amount in many home computers).

What is a "K?" You should also ask: what is a *byte*? A *byte* is a unit of measuring information. One letter, comma, space, period or other character occupies one byte. This article, which is filled with letters, commas, periods, spaces and symbols, is approximately 14336 bytes, or "14K" bytes.

We use "K" for approximately 1000 (actually 1024) bytes to estimate the various sizes of internal RAM or external disk memory:

| | |
|---|---|
| 64K | 64 kilobytes, a standard amount of internal memory, or RAM, in CP/M systems. |
| 256K | 256 kilobytes, a standard amount of floppy disk space on single-density, single sided (unformatted) disks. Also, a large amount of RAM typical in large "16-bit" systems. |
| 5M | 5 megabytes, or 5000 kilobytes, a standard amount of disk space in Winchester-type hard disk subsystems. |

You can add a hard disk subsystem to your personal computer to hold a large data base holding data such as inventory, accounting, or client records. Most hard disks for personal computers are also known as "Winchester-type disks" after the "Winchester" technology developed by IBM.

A professional writer could use a small computer with two floppy disk drives, a printer, and a modem to transfer data over telephone lines to and from other computers. The two floppy disk drives are more than adequate for word processing, budgeting, project planning and other personal business activities, which can be kept on separate sets of disks.

## *Typical Applications*

For typical applications there are "off the shelf" software packages. Such a package contains a program (or set of programs) that performs the application in a typical way. For example, programs to do accounting follow standard accounting principles and are acceptable for use by certified public accountants.

The most typical application so far has been word processing. Nearly everyone has some word processing to do — writing documents, memos, reports, letters, novels, etc. There are numerous word processing programs available for CP/M systems (such as WordStar, Magic Wand, Spellbinder, etc.).

Another typical application is data communications. There are programs to handle transfer of data to remote computers, to use information services like The Source or CompuServe, and to "talk" to "host" computers from your home or portable computer. The latter activity is typical among corporate managers away from the office who need to communicate with their office computers.

The most important overall application is data management. Computers can organize information into *data bases* that let you find a specific record with a simple command. However, data base management programs usually need to be tailor-made or adjusted for your data base application.

Standard "off the shelf" accounting and inventory data base programs can be integrated within an overall management program, or separated into "modules" for accounts receivable, accounts payable, payroll, etc. Data management programs usually have "report generators," or modules that print reports. These modules can be combined and altered to fit your application.

A program useful for a general activity such as accounts payable may be incorporated into a more specific overall program to handle a specific application, such as medical patient billing. There are client-handling programs that are tailor-made for doctors, lawyers, tax accountants and even tailors.

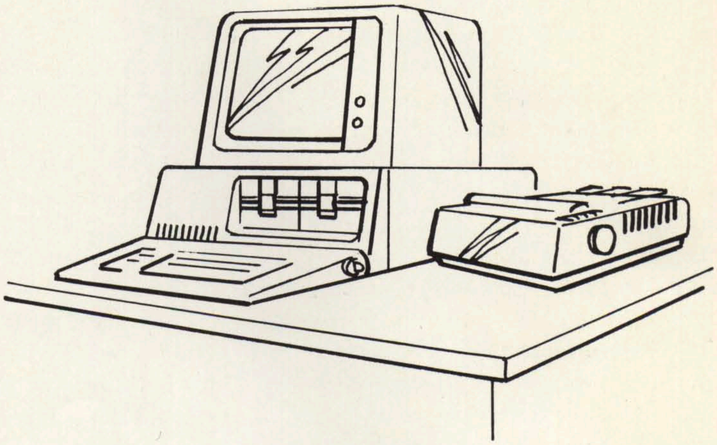
To shop for a computer, you should first shop for an application program suited to your application needs. This advice is summed up as "look for the software first, then the machine (hardware) to run the software you need."

* * *

This description provided a glimpse into this complicated world of floppy disks and computerese. Don't be thrown by acronyms like PIP or terms like *byte* and *backup*. Every new technological achievement introduces new words to our vocabulary. You'll pick up the acronyms and buzz words as you learn to use computers, and you may find yourself buzzing with excitement after a few days with a new computer. Remember that for every computer phreak there must have been a first time, a stage that you are going through now: familiarizing yourself with personal computers and the world of CP/M.

*A Tutorial on CP/M-80 & CP/M-86...*

# Learning To Use CP/M



by Tony Bove & Cheryl Rhodes

CP/M stands for "Control Program for Microcomputers." It is a *disk operating system* — a master control program that supervises all activities in a disk-based computer system.

Although not as sophisticated as the Master Control Program in Walt Disney's *TRON*, or as intelligent as HAL in Stanley Kubrick's *2001*, CP/M appears on many different small computers as the master program that controls all other programs and computing efforts.

All versions of CP/M start with the kernal created by Digital Research, Inc. (DRI). Most systems employ customized versions of CP/M, either modified by DRI or by the system manufacturer or packager. Many small computers for business and professional applications run a version of CP/M.

*Some introductory technical data, for those who need it:* CP/M-80 (the "eight-bit" version) is offered for many different computers that are based on the Z80 microprocessor (Zilog) or based on the 8080 and 8085 processors (Intel). CP/M- 86 (the new "sixteen-bit" version) is offered for computers based on the 8086 or 8088 microprocessors (Intel). A version for computers based on the Motorolla 68000 (CP/M-68) is in the works and may be available at this time. Yes, this tutorial covers both CP/M-80 and CP/M-86 (sorry, not CP/M-68, not yet!).

Although a computer can be programmed to do various things, to most people a computer is not useful unless it is already programmed to do useful things — that is, it must be supplied with an operating system and useful application programs, such as programs for accounting, word processing, budgeting and forecasting, data base management, etc.

CP/M is a popular operating system because it has a large library of application programs. The primary use of CP/M is to control your computer in order to run these application programs. CP/M manages your use of them, and gives you the ability to run other programs as well as write and run your own.

CP/M is supplied on one floppy disk, called the *master system disk*, along with utility programs provided with CP/M. The next section describes ordinary "vanilla" CP/M as it appears on most computers. Differences in customized versions for popular computers are described in boxed sections accompanying this article.

## *Starting CP/M*

First, turn on any devices connected to your computer (including disk drives, printers, terminal, etc.), and then turn on the computer unit.

Insert your system disk (either your master disk, or a backup copy of it) into drive A. Press the RESET button on your computer (some computers have a reset key on the keyboard, and some require a special key combination, such as SHIFT and RESET). The CP/M system should display a message, such as **64K CP/M** or **48K CP/M**, possibly accompanied by a copyright notice and a version number. (**This typeface** is used to show screen messages.)

The system should also display a *prompt* message: usually **A⟩** or **0A⟩**. The prompt tells you what disk drive the system is currently using to look for all files (including programs). To see a list of the names of these files, type the command ***DIR*** and press your RETURN key.

☞ NOTE: Your keyboard should have a key marked "RETURN" or "CR", "ENTER", or "NEW LINE". If it doesn't have one of these, ask your dealer which key is the RETURN or Carriage Return key. We use the ⏎ symbol in the following example to stand for the RETURN key. We also use ***THIS TYPEFACE*** to show words you type; and **THIS TYPEFACE** to show words displayed by the system.

If you have two disk drives, find a suitable disk (one that already works with your system) to insert into the second drive, known as drive B. (If you don't have a suitable disk, you will have to prepare one by *formatting* it — skip to the instructions on formatting a disk).

With a disk in drive B, type the following command (a ***B*** followed by a colon and the RETURN key):

```
A⟩B:⏎
B⟩
```

The prompt changed to **B⟩**. You have woken up drive B, and put drive A back to sleep. If your drives have LED indicators (red lights), drive A probably went off and drive B went on.

Now that you are in the world of drive B, you must tell CP/M that a new disk has been inserted. Don't ask why — this is customary procedure for introducing a disk to CP/M. Hold down your CONTROL key (sometimes marked CTRL, CNTL or ALT) and type a ***C***. Your screen should display **↑C** (the ↑ stands for the CONTROL key). This is explained further in "Inserting Disks."

For more examples, go back to drive A with the following command:

```
B⟩A:⏎
A⟩
```

## *Filenames and the DIR Command*

You may already know the DIR command (type ***DIR*** and press RETURN).

The DIR command displays a directory listing of *filenames*. CP/M finds a file by using its name. The three letters following each filename indicate the type of each file. For example, "COM" (and also "CMD" for CP/M-86) tells you that the file contains a program that can be used as a command. These three letters are called the *file type* or *filename extension*.

The three-letter extension is actually part of the file's name, and is used to differentiate types of files. For example, you may have files with the "COM" extension (programs used as commands), files with the "TXT" extension (files holding the text of documents), files with the "DOC" extension (files holding entire documents), etc.

The following shows two DIR commands — one in CP/M-80 and one in CP/M-86:

```
CP/M-80                                 CP/M-86

A⟩DIR↵                                  A⟩DIR↵
A:ASM             COM                   A:ASM86           CMD
A:DDT             COM                   A:COPYDISK        CMD
A:ED              COM                   A:DDT86           CMD
A:PIP             COM                   A:ED              CMD
A:STAT            COM                   A:PIP             CMD
A:SYSGEN          COM                   A:STAT            CMD
```

Your DIR display may look different, since your disk has different files. Most of the filenames shown above should be on your system disk (the disk in drive A). For example, you should have a file named PIP.COM, which is used in subsequent examples. CP/M-86 users can also have special files called *system* files that are not displayed with ordinary DIR commands. You must use the DIRS command (substitute the keyword "DIRS" for "DIR" in the examples) to display filenames of system files.

The DIR command by itself displays the entire directory list of files on disk. You can also use the DIR command to find a file in the directory listing by specifying the filename with DIR. You must specify the *entire* filename, including the extension, by typing the name, followed by a period, followed by the extension.

For example, to see if the file ***PIP*** with the extension ***COM*** (PIP.COM) is on the disk, type the following DIR command:

```
CP/M-80                                 CP/M-86

A⟩DIR PIP.COM↵                          A⟩DIR PIP.CMD↵
```

☞ NOTE: You get the message **NO FILE** if you do not have a file named PIP.COM (PIP.CMD in CP/M-86) on the disk in drive A. Try looking for a file named STAT.COM (STAT.CMD). Both are utility programs usually supplied with CP/M ("CMD" files are supplied with CP/M-86).

**Creating a File:**

In order to understand files, you may want to create one for use in examples and to use in experiments with CP/M commands. CP/M provides only one way to create a file: using ED, the text editing program, to create a text file.

Since there are much better word processing programs than ED to use to create files, we urge you to try using WordStar, Select, Magic Wand, or whatever word processing program you have, to create a file. If you have no word processing program, consult the ED tutorial in your manual supplied with CP/M (or see *DataCast* #2).

If you have neither the time nor inclination to use another word processing program or to learn ED, try this simple exercise to create an empty file, which can then be used in subsequent examples. Type the following ED command:

```
A⟩ED SAMPLE.TXT↵
NEW FILE
:*
```

You can now type the letter ***E*** (followed by RETURN) to leave the ED program and save SAMPLE.TXT:

```
:*E↵
A⟩
```

Once you have a file named SAMPLE.TXT, you can use the examples in this tutorial (you can substitute any file's name for the name SAMPLE.TXT in the examples in this article). Using CP/M you will make a copy of the file, rename its copy, display the file's contents on your screen, and print the file.

**Filename Rules:**

Here's a summary of the rules governing filenames (the *italic* parts are optional):

*d:****filename****.ext*

The ***filename*** is a unique name for the file (up to eight characters). The optional *.ext* is a typical three- character extension used to indicate the type of file. You can use fewer than eight characters for the name and fewer than three characters for the extension. You can name a file with no extension, or with an extension and no name; the unnamed portion is set to blanks.

You can also specify with the filename the optional *d:* — a disk drive letter followed by colon — to specify a file on a disk other than the current disk indicated in the prompt. Drive A is indicated by the prompt **A⟩**, drive B is indicated by the prompt **B⟩**, and so on. If you have a file named SAMPLE.TXT on the disk in drive B, you could type the following command (while the **A⟩** prompt is displayed) to see a directory listing of it:

```
A⟩DIR B:SAMPLE.TXT↵
```

Of course, you get a disk error message (**DRIVE B NOT READY**) if you have no disk in drive B. You get the message **NO FILE** if you do not have a file named SAMPLE.TXT on the disk in drive B.

**File Naming**

The basic idea is to use names that describe the file well enough to tell you what is in the file. You don't want to have to look inside a file to know what it contains. As with file folders and descriptive labels, you use a name that identifies the file and makes it unique.

You can use letters, numbers, dashes, slashes, plus signs, dollar signs, pound signs, etc. For example, we use the following filenames for files that hold the text of of a book:

**CHAP1-1.TXT** — Part one of chapter one.
**CHAP1-2.TXT** — Part two of chapter one.
**CHAP2-1.TXT** — Part one of chapter two.
**-OUTLINE.TXT** — Outline, not full document
**08/02/82.TXT** — Entry for an on-going diary.

Many of the popular filename extensions, or file types, were invented by programmers from the forgotten years of timesharing and batch programming. Here's a list of extensions we've found on a variety of CP/M systems (a list like this cannot be complete):

| | |
|---|---|
| .ASM | Source file of an assembly language program. |
| .BAK | Backup copy of a text or data file. |
| .BAS | Source file of a BASIC program. |
| .COB | Source file of a COBOL program. |
| .COM | File containing an executable program or transient command. |
| .CMD | File containing an executable program or transient command for CP/M-86 system. |
| .DAT | File of character or numeric data. |
| .DOC | File of messages or documentation. |
| .FOR | Source file of a FORTRAN program. |
| .HEX | A file of hexadecimal values in the Intel format (created by the ASM program). |

| | |
|---|---|
| .INT | File containing a CBASIC executable program (created from a ".BAS" file). |
| .LIB | File (library) containing source routines for programs. |
| .LST | File containing a printable listing of a program. |
| .MAC | Source file of an assembly language subroutine. |
| .MSG | File containing one or more messages. |
| .PAS | Source file of a Pascal program. |
| .PCO | File containing a Pascal executable module. |
| .PRL | Page-relocatable MP/M file. |
| .PRN | Printable file prepared by text formatter or other program. |
| .REL | Relocatable MBASIC program file. |
| .SAV | System file in CP/M version 2.0 and newer. |
| .SRC | Source file from the CP/M User's Group. |
| .SUB | Source file of commands for the SUBMIT program. |
| .SYM | Symbol table generated by MAC program. |
| .TEX | Text file to be formatted by the TEX program. |
| .TXT | General purpose text file. |
| .WRK | Temporary "work" file created by some programs. |
| .$$$ | Temporary file created by some programs. |

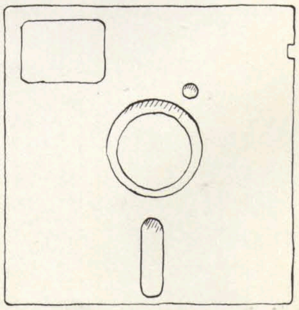
Don't worry — unless you intend to do a lot of programming, you will probably never use most of these extensions. You will want to use ".TXT" and ".BAK" for word processing files. You may also use ".SUB" to create files of commands for the SUBMIT program. Otherwise, you should know about these extensions in order to identify strange files.

If you have another disk with CP/M files on it (to use in drive B), you can skip the "Formatting Disks" and "System Disk Backup" procedures and examples. If, however, you have only one system disk, you should follow these procedures and examples to make a backup copy of it. You don't want to destroy your only copies of files through a typing mistake or careless error. You should always keep two or more backup copies of files — one for safekeeping, and one to uphold Murphy's Law.

## *Formatting Disks*

Most customized versions of CP/M require that you prepare a new or recycled disk before using it with your system. A program called FORMAT or INIT (for "initialize") is usually supplied with your computer. Check your system's documentation for a disk formatting, initializing or preparing program (usually called FORMAT or INIT).

A reminder: check to see that your disk is not "write- protected" before you try to format it. Floppy disks that are eight-inch in diameter usually require a piece of tape covering a notch on the disk jacket (see figure 1) to make them usable (otherwise they are "write protected"). Floppies that are five- inch in diameter are the opposite: they require the notch to be uncovered.



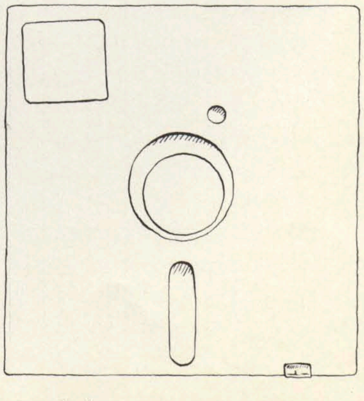


**Figure 1:** *To remove the "write-protection" that keeps you from changing the data on a disk, you* use tape to cover *the notch of an eight-inch disk, or you* remove any tape *covering the notch of a five-inch disk.*

When you format a disk, the system wipes out any information already on the disk and prepares the disk to receive new information (organizes the disk's sectors and tracks). After formatting, the disk is a CP/M disk that cannot be used in a non-CP/M system unless it is re-formatted for *that* system.

☞ NOTE for eight-inch disk users: If you prepare the new eight inch disk in the standard CP/M single-density single sided format, it should be usable in other CP/M systems that use eight- inch disk drives. This format is also known as the "IBM 3740" format (128 bytes per sector). Most systems offer both the standard format *and* their own unique double-density and double-sided formats that are not compatible with other CP/M systems (they are offered for greater data capacity per disk).

The FORMAT and INIT programs are different for each type of computer; however, there are many similarities. Most FORMAT and INIT programs let you specify either drive A or drive B to hold the disk to be formatted. Most FORMAT and INIT programs also perform a verification to check for bad sectors on the disk (a bad sector is one that cannot hold information). At the end of the formatting session, the programs usually ask you to insert a regular system disk to start (or "boot") the system.

Most computer manufacturers provide their own proprietary formats that cannot be used with other computers (usually a double-density or quad-density format). The single-density format for eight-inch disks is considered a standard CP/M format that can be used with any CP/M system using an eight-inch disk drive. (Unfortunately there is no standard five-inch disk format).

For information on your particular FORMAT or INIT program, consult your manual, or ask your dealer.

## *Copying the System Disk*

If you haven't already done so, you must make a backup copy of your master system disk. It is good practice to make a new backup disk after 80 hours of use (using your old backup disk as the "source" and the new disk as the "destination" of the copy). If possible, format a new disk for the new backup, or recycle a good disk that contains data no longer needed. Attach a label to the disk before formatting it. The label should identify the disk as a system disk, perhaps with the date and an id number to show that it is a backup of another disk.

### CP/M-86: COPYDISK Utility

CP/M-86 users (the "sixteen-bit" version) have a new utility called COPYDISK (the COPYDISK.CMD program), which copies all tracks from one disk to another disk. Since COPYDISK copies the first two tracks of the disk as well as the rest of them, it copies the system itself to the new disk, thus creating a new system disk that is an exact duplicate of the original system disk.

If you have a two-drive system, be sure you have a formatted disk in drive B. If you have only one drive, keep the formatted disk ready. Type the following command:

```
A⟩COPYDISK↵

Enter Source Disk Drive (A-D) ?A↵           (original system disk)
Destination Disk Drive (A-D) ?B↵                        (new copy)

Copying disk A: to disk B:
Is this what you want to do (Y/N) ? Y↵                (answer yes)
```

If you have a single drive system, the COPYDISK program will tell you to replace your "source" disk (the original) with the "destination" disk (your new copy). At the end of the COPYDISK operation, the program asks if you want to make another copy. Answer ***Y*** if you do, or ***N*** if you want to return to CP/M.

### CP/M-80: Custom Duplicating Programs

Customized CP/M systems sometimes include customized programs for copying disks. If you have a single drive system, you *must* have such a program (the regular PIP cannot handle single disk drives without modification).

There are two kinds of custom programs:

- Programs that copy everything on one disk to another disk, including the system tracks that make the disk a system disk. Follow the specific instructions for your program. (CP/M-86 users have the COPYDISK program — see "CP/M-86: COPYDISK" above).

- Programs that copy data file and program tracks, *but not* system tracks. Follow the instructions presented here.

### CP/M-80: SYSGEN & PIP

#### For Double Drive Systems

Most CP/M-80 systems have at least two disk drives. If you have a system with only one, skip to "Single Drive Systems" first before reading these instructions.

Insert into drive B the new disk to receive the copy, and *format* the new disk if your CP/M system requires disk formatting.

The SYSGEN program supplied only with CP/M-80 systems (SYSGEN.COM in the DIR listing for drive A) will place a copy of the system onto your new backup disk. Some computers are supplied with a customized SYSGEN program by another name, such as SYST1K, CCSGEN, GENSYS, and so on. Check your manuals for the name of the program and its instructions. Many of them look and act like the regular SYSGEN.

Execute the SYSGEN program by typing ***SYSGEN*** followed by the RETURN key:

```
A>SYSGEN↵
```

SYSGEN asks for the "source" drive with the system disk you are using; since your system disk is normally in drive A, you can type ***A*** followed by the RETURN key. Note, however, that if you modified your system and the modified version is running (i.e., it is in memory) but not yet stored on the disk in drive A, *you must skip this question* by pressing only the RETURN key.

SYSGEN then asks for the "destination" drive with the disk to receive a copy of the system. Type ***B*** for drive B (the drive with the disk to hold the copy):

```
A>SYSGEN ↵
SOURCE DRIVE NAME (OR RETURN TO SKIP):A↵
SOURCE ON A:, THEN TYPE RETURN ↵
FUNCTION COMPLETE
DESTINATION DRIVE NAME (OR RETURN TO REBOOT): B↵
DESTINATION ON B:, THEN TYPE RETURN ↵
```

When SYSGEN completes its function, it displays the message:

```
FUNCTION COMPLETE
```

If you want to make more copies, insert another new disk into drive B and type ***B*** to the following question. If you are finished copying the system, press RETURN to "reboot" the system:

```
DESTINATION DRIVE NAME (OR RETURN TO REBOOT):↵
A>
```

The SYSGEN program places a copy of the CP/M operating system on the first two tracks of the new disk. You can use SYSGEN as shown above to make a copy of the system as it is, without change, and place it on disk.

Wait! There is one more important step. SYSGEN copied only the *system* software to the backup disk. Now you have to copy the *programs* and other files from the system disk to your new backup copy. The easiest way to do this (in the absence of a customized COPY or DUP program) is to use the following PIP command:

```
A⟩PIP B:=A:*.*⮐
```

This command copies all the files on the disk in drive A to the disk in drive B. If you employ user areas, this command only copies the files in user area 0 (see "User Areas").

### CP/M-80: SYSGEN For Single-Drive Systems

In the absence of a custom program from your dealer or computer manufacturer that copies the system tracks with the rest of the disk, use SYSGEN as described above, with the following changes to the procedures:

After typing ***A*** for the "source" drive, and the RETURN key twice, the **FUNCTION COMPLETE** message should appear, followed by the question about your "destination" drive. Take out your system disk and replace it with the new disk to be the backup. Answer by typing ***A*** as the "destination" disk, followed by two RETURN keys, and SYSGEN should copy the system onto the new backup disk.

To copy all files from the system disk to your new backup disk, you need a special customized program for your system, since PIP (described above) only works with systems with more than one disk drive.

If this procedure does not work, consult your dealer or computer manufacturer — they must know a way to make backup copies of your master system disk!

## *Inserting a Disk: Remember ↑C*

In most CP/M systems, you use a system disk in drive A to hold your system and application programs, and a data disk in drive B to hold your data and text files. These disks must be *formatted* to be used with your system; otherwise, your system will not recognize the disk, and the computer will probably "hang" as if in a daydream, waiting for you to insert a proper disk (or to reset the system).

In most cases, when you insert a formatted disk in a drive, or replace a disk in a drive with a different disk, you should warn CP/M by typing a CONTROL-C (hold down your CONTROL key and type a ***C***). This tells CP/M how to put data on the new disk.

There are times, when using programs like PIP or FORMAT, where you can insert a different disk and not type a CONTROL-C (see "Copying Files: Using Two Drives"). However, if you try to put data on the new disk, you may get an error message (such as **Bdos Error On B: R/O**). You should then type a CONTROL-C. The CONTROL-C (displayed as **↑C**) tells CP/M where data should be stored on the disk.

## *Switching Drives*

CP/M will always look in drive A for a file, unless you:

- add a ***B:*** prefix to the filename to tell CP/M to look in drive B, or
- *switch to drive B.* Simply type the drive prefix as a command:

```
A⟩B:⮐
B⟩
```

A DIR command typed after the **B⟩** prompt displays the entire directory for the disk in drive B. To switch to drive C (if you have one), type ***C:*** followed by RETURN. To switch to drive A, type ***A:*** followed by RETURN.

## *CONTROL Key Combinations*

The CONTROL key (sometimes called CTRL, CNTL or ALT) can be used in combination with another key to perform command line editing or other functions.

*Line editing* commands help you type command lines and correct mistakes. If you make a typing mistake, use the RUBOUT (or DELETE) key. If you're not sure what you've typed (some terminals re-display the rubbed-out characters when you use RUBOUT or DELETE), try this line editing command: hold down the CONTROL key and type ***R***. This combination (↑***R***) re-displays your command line without the rubbed-out characters.

To delete a line (and not send it to CP/M), use **↑X** or **↑U**. Here's a summary of the command line editing combinations:

| | |
|---|---|
| **↑E** | Move the cursor down to the beginning of the next line without performing a RETURN. Useful for typing long command lines. |
| **↑H** | Delete one character and erase it from the screen (move cursor left over the previous character). CP/M version 2.0 and newer. |
| **↑I** | Move the cursor right one tab space (eight or less spaces, to the next "tab stop"). |
| **↑J** | Same as RETURN (line feed). |
| **↑M** | Same as RETURN (carriage return). |
| **↑R** | Repeat the comand line without rubbed-out characters. |
| RETURN | Send the line to CP/M as a command to be acted upon, and move the cursor down to the beginning of the next line. |
| RUBOUT | Delete a character and re-display the "rubbed-out" character. |
| **↑U** or<br>**↑X** | Delete the command line without sending it to CP/M. |

Other CONTROL key combinations perform useful CP/M functions:

| | |
|---|---|
| **↑C** | Alert CP/M to the fact that you just inserted a new disk or replaced a disk in a drive. Also used to stop ("abort") some programs (WordStar is an exception). CONTROL-C restarts CP/M or performs warm start for a newly inserted disk. In CP/M- 86, one CONTROL-C while a program is running aborts the running program. Without a program running, CONTROL-C restarts CP/M-86 (without a disk access) and sets all disk drives to read-write status (**RW** — see "STAT Utility"). |
| **↑P** | Turn on (or off) your "list" device, usually your printer, to "echo" (repeat) everything that occurs on your screen and everything you type. Use **↑P** to turn *off* this function after turning it on with **↑P**. |
| **↑S** | Stop long displays on your screen (often used with the TYPE command). Continue displaying ("scrolling") by typing any key except **↑C**. |
| **↑Z** | Use with the ED or PIP programs to terminate a list of characters or inserted text (used to mark the end of a text file). |

## *Copying Non-System Disks: Instructions For The PIP Utility*

Some CP/M systems have a customized copying program that copies your disks faster or easier than the conventional way using PIP. If you have only one disk drive, you must have such a program. Consult your manual.

☞ NOTE: CP/M-86 users have the new COPYDISK program that copies all the information on one disk to another disk, including the system tracks if they are present on the disk being copied (the *source* disk). Look back to "CP/M-86: COPYDISK Utility" or try the command ***HELP COPYDISK***.

### PIP Using Three Disk Drives

The following procedures assume that you have three floppy disk drives: drives A, B, and C (if your drives are labeled A, E, and F, substitute E for B and F for C in the following procedures). If you have only two drives, skip to the next section. If you use a hard disk, skip to the "Hard Disk" instructions.

1. Leave your CP/M system disk in drive A.

2. Insert the disk to be copied into drive B (the original, or source disk).

3. Insert the receiving disk (the one to hold the backup copies) into drive C (your third drive). Be sure that this disk is not write-protected (see figure 1).

4. If your receiving disk is new (never used before with CP/M), it needs to be *formatted* (look back at "Formatting Disks").

5. After formatting the new disk in drive C (if it needed to be formatted), type the command ***C:*** and press your RETURN key.

6. When you see the **C**⟩ prompt, hold down the CONTROL key and type a ***C***. The **C**⟩ prompt should reappear.

7. Type the command ***A:*** (followed by RETURN), wait for the **A**⟩ to appear, and then type this command (followed by the RETURN key):

```
A⟩PIP C:=B:*.*↵
```

8. Watch the names of the files go by. They are all being copied to the disk in drive C. Be patient.

9. When it finishes, take your new disk out of drive C (you're done). Put a label on the new disk to show that it is a backup of the disk in drive B. You should never write directly onto the floppy disk, because too much pressure from a ball point pen or pencil will destroy the data. Write on the label before attaching the label to the disk.

### Using Two Disk Drives

The following procedures assume that you have two floppy disk drives: drive A and drive B. If you use a hard disk, skip to the "Hard Disk" instructions.

1. Leave your system disk in drive A.

2. Insert the receiving disk (the one to hold backup copies) into drive B, as shown in figure 2. Be sure that the receiving disk is not write-protected (see figure 1).

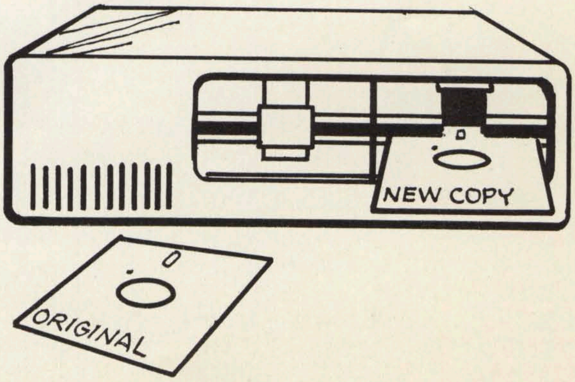


**Figure 2.** *Insert the receiving disk into drive B.*

3. If your receiving disk is new (never used before with CP/M), it probably needs to be *formatted* (look back at "Formatting Disks").

4. What about the original (source) disk to be copied? Put it aside for a moment (figure 2).

5. Type the command ***B:*** and press your RETURN key.

6. When you see the **B⟩** prompt, hold down the CONTROL key and type a ***C***. The **B⟩** prompt should reappear.

7. Type the command ***A:*** (followed by RETURN), wait for the **A⟩** to appear, and then type the command ***PIP*** (followed by RETURN). An asterisk (*) should appear.

8. Take your system disk out of drive A and replace it with the original (source) disk to be copied (see figure 3).

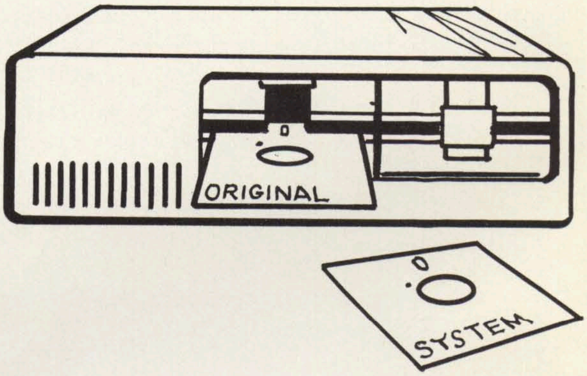


**Figure 3.** *Take out the system disk and replace it with the original disk to be copied.*

9. Type the following command (followed by RETURN):

```
*B:= *.*↵
```

10. Watch the names of the files go by. They are all being copied from drive A to drive B. Be patient.

11. When it finishes, take your receiving disk out of drive B (figure 4). Put a label on it to show that it is a backup of the disk in drive A. You should never write directly onto the floppy disk, because too much pressure from a ball point pen or pencil will destroy the data. Write on the label before attaching the label to the disk.

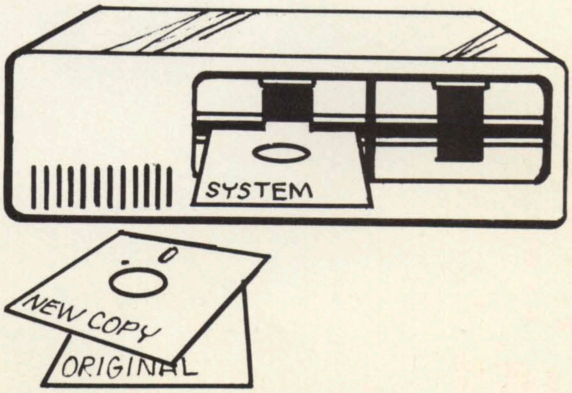


**Figure 4.** *Take the original disk out of drive A, and the new copy disk out of drive B, and put the system disk back into drive A.*

12. Take the original disk out of drive A, and replace it with the system disk (figure 4). *Do not type anything until you've inserted a system disk!*

13. After inserting the system disk, press the RETURN key. The PIP program stops, and the familiar **A〉** prompt should reappear.

**Using a Hard Disk**

Systems with a hard disk can make the hard disk act as any drive or set of drives. For these instructions, we assume the hard disk is acting as drive A, and that a floppy disk drive is acting as drive B. This makes sense, because the hard disk should be the most active one, and all system files should be located on it, as well as all application programs. The floppy disks used in drive B (or whatever drive is assigned to floppy disks) are archival disks used to store copies of programs and data files.

To copy files from the hard disk, format a new or recycled disk in drive B and use PIP:

```
A〉PIP B:= *.*↩
```

This command will copy *only the files in your current user area* to the same user area number on drive B. If you don't use *user area numbers* to segregate files on disk, files are all considered to be in user area zero (the default).

You can use the USER command to switch to another user area. For example, ***USER 2*** followed by RETURN will put you in user area 2 if the system allows you to be there (in multi-user systems, another terminal may be using user area 2).

To copy files from one user area to another, add the ***[Gn]*** parameter, where ***n*** is the user area you are copying from. Initiate the following command from the user area to receive the copies:

```
0B〉USER 1↩
1B〉PIP A:=B:*.*[G0]↩
```

This example copies the files from user area 0 on drive B (using the ***[G0]*** parameter) to user area 1 on drive A, because the PIP operation was started from user area 1 (as indicated by the **1B〉** prompt).

## *Filename Matches*

You typed ****.**** rather than complete filenames in the above examples. You did so to specify *all* files on the disk at once.

To see if several files are on a disk, CP/M provides a way to display with DIR *several files at once* without displaying the entire disk directory. A *filename match* is a partial filename with special symbols to match arbitrary characters of a filename. They are also known as *ambiguous filenames*.

The special symbols are ***** to match any number of characters, and ***?*** to match one character. For example, the ambiguous filename ***FRE?.**** would match the filenames FRE1.ASM, FRE2.ASM, FRET.TXT, FRET.BAK and FREE.BAS.

In a DIR command to see only the files on drive B containing chapters (CHAP1.TXT, CHAP2.TXT, and so on), you would type:

```
A〉DIR B:CHAP?.TXT↩
```

You can use ambiguous filenames to match files in other commands, such as PIP (to copy several files at once) and ERA (to erase several files at once — watch out!).

The following table shows ambiguous filenames and the names they match:

| Ambiguous Filename | Filename Matches |
|---|---|
| *SAMPLE.** | **SAMPLE.ASM SAMPLE.TXT SAMPLE.$$ SAMPLE.T SAMPLE.COM SAMPLE.BAS SAMPLE.12 SAMPLE** |
| *SA*.COM* | **SAMPLE.COM SAVE.COM SALE.COM SA.COM** |
| *SA??.COM* | **SAVE.COM SALE.COM** |
| *.COM | All filenames with ".COM" extensions |
| *.* or ????????.??? | All filenames on the disk |
| * or ???????? | All filenames without extensions |
| *SA.COM | *All filenames with ".COM" extensions |

*An asterisk used as the first character matches any characters up to the extension, even if you include characters between the asterisk and the extension.

---

## *Using PIP: the Desktop Copier*

The PIP program gives you many ways to transfer information from one file to another, and from one disk to another. You can also use PIP to transfer information to a device like a printer or modem.

Most PIP operations involve copying a file from one disk to another (example #2); however, some users need to make a copy of a file *on the same disk*, so that experiments with the file do not endanger the only copy. Remember, two files on the same disk should not have the same name (otherwise CP/M may only be able to find one of them).

To make a copy of a file on the same disk, you must give the new copy a different name. The following example (#1) shows PIP being used to make a copy of SAMPLE.TXT called SAMPL1.TXT.

**Example 1.**

```
A>PIP SAMPL1.TXT=SAMPLE.TXT↩
```

PIP forces you to name these files in an unusual manner. You must name the *new copy* first (SAMPL1.TXT), before typing = and the filename of the original file.

It is more likely that you will want to copy SAMPLE.TXT to the disk in drive B (if it is not already there). Example #2 shows the PIP command copying a file from one disk to another, using the same name for the copy.

**Example 2.**

```
A>PIP B:=A:SAMPLE.TXT↩
```

You can also copy a file to another disk and use a *different* name for the copy:

**Example 3.**

```
A>PIP B:NEWCOPY.TXT=A:SAMPLE.TXT↩
```

The PIP command in Example #3 resembles the one in Example #1. Both use a new name for the new copy, but Example #3 transfers the copy to another disk. It is easy to make a mistake with PIP — for example, if you forgot the ***B:*** prefix to ***NEW COPY.TXT***, the file would have been created on the disk in drive A, not drive B as intended.

### Copy All Files to Another Drive

You can use PIP to copy an entire disk if you use the ****.**** expression to match all filenames.

> ☞ NOTE: If you separate files on the disk into *user areas*, PIP will only copy files from the *current user area* To copy files in another user area, you must use the ***[Gn]*** parameter described later in "User Areas."

**Example 4.**

```
A⟩PIP B:=A:*.*↵
```

### Copy Several Files to Another Drive

The PIP command in Example 4 copies all files on the disk in drive A to the disk in drive B, keeping the same names for the copies. You can also select a group of files with a filename match. The following example copies all files with the ".TXT" extension from drive B to drive A:

**Example 5.**

```
A⟩PIP A:=B:*.TXT↵
```

### Multiple PIP Commands

You can run several PIP operations without having to repeat the keyword ***PIP***. Type ***PIP*** by itself, followed by RETURN, and the program takes over and displays its * prompt:

**Example 6.**

```
A⟩PIP↵
*
```

At the * prompt display, you can type many PIP commands without typing the keyword ***PIP*** Example 7 shows several PIP commands. To leave the PIP program, press the RETURN key alone as a command to PIP. Be sure you have a system disk in drive A when you leave PIP.

**Example 7.**

```
*A:=B:SAMPLE.TXT↵                          (Copying SAMPLE.TXT from drive B)
*A:=B:*.OVR↵                        (Copying all files with the ".OVR" extension)
COPYING-
WSOVLY1.OVR
WSMSGS.OVR
MAILMRGE.OVR
*A:=B:WS.COM↵                                      (Copying WS.COM)
*↵                                           (Stopping PIP operations)
```

This multiple PIP technique was used before in this article to copy the contents of an entire disk to another disk in a two-drive system where neither disk is a system disk (see "Copying Non-System Disks"). With the PIP program activated and in memory, you can remove the system disk and use drive A to hold the original disk to be copied. You must put the system disk back in drive A before leaving PIP.

**Copy Files to the Printer**

By now you are familiar with the PIP command structure:

```
PIP destination = source↵
```

A CP/M system pretends to have certain devices, whether or not you actually have those devices connected to your system. For example, you may not have a printer, but CP/M "logically" assumes that you do have one. If you tell CP/M to send a file to the printer, CP/M will send it to the "logical" printing device. If you have no printer, or if the printer is not connected properly, CP/M may either send the data into oblivion and return for the next command, or "hang" until you use your RESET button (or key) to restart CP/M.

Most application programs control the printing operations for you. It is most likely that you will print files using programs like WordStar or SuperCalc, not using the PIP command. However, PIP provides a simple way to print a file, and even gives you several options to use to control the printing.

To send a copy of a file to your printer, you pretend that the printer is the *destination* file by using a special *device name* in the PIP command: ***LST:*** Example 8 shows the PIP command transfering the file SAMPLE.TXT to the printer, and then transferring B:CHAP1.TXT to the printer.

**Example 8.**

```
A>PIP LST:=SAMPLE.TXT↵
A>PIP LST:=B:CHAP1.TXT↵
```

☞ NOTE: If the file you send to the printer is not a printable file (i.e., it is a program, or file that does not contain straight text), or if the file has special control characters that are not familiar to your printer, you may not be able to print the file using PIP. The system will "hang" if such problems occur — simply restart the system, and check your manuals or check with your system dealer.

Options such as ***[F]*** (filter form-feeds), ***[Pn]*** (set page length) and ***[Tn]*** (expand tabs to ***n*** spaces) may be useful in print operations (see "Using PIP Options").

**Concatenate Files**

You can *concatenate* files (add the contents of a file to the end of another, and so on) using the PIP command, and store the result (the joined files) in *another* file without changing in any way the originally separated files. For example, you would want to concatenate with PIP separate parts of a chapter into one file in order to print the chapter as a unit.

Example 9 shows a PIP command combining the contents of DAY1.TXT, DAY2.TXT, DAY3.TXT, DAY4.TXT and DAY5.TXT into a new file called WEEK1.TXT, and in the proper order of days, without disturbing the individual "day" files.

**Example 9.**

```
A>PIP WEEK1.TXT=DAY1.TXT,DAY2.TXT,DAY3.TXT,DAY4.TXT,DAY5.TXT↵
```

If you want to combine the contents of the "day" files *only for the printer* rather than combining them into a new file, you would use the ***LST:*** device name (shown in Example 8 in place of the filename WEEK1.TXT in Example 9.

**Copy To/From Other Devices**

If you want to know a simple way to type a single line of text into a file, see Example 10. Otherwise, you can safely skip this section on devices and the next section on PIP options. They are here for readers who want to perform special operations. You may need this information later, but beginners can safely skip to "Displaying Files." (However, if you need to put text into a file for the displaying examples, use Example 10.)

PIP makes it possible to transfer the contents of files to devices like modems, paper-tape punchers or specialized output devices, and to transfer data from input devices like modems, paper-tape readers or special reading devices into CP/M files. You should consult your manuals before trying these operations (i.e., you should already know what to do before using special device names in PIP commands).

The simplest device-transfer operation, using PIP, is the one shown in Example 10. In this example PIP transfers a line of text you type at your keyboard (***CON:*** device) to the file SAMPLE.TXT. Unfortunately, this method only works well for typing a single line. You must type a CONTROL-Z (hold down your CONTROL key and type ***Z***) to stop the operation.

**Example 10.**

```
A⟩PIP SAMPLE.TXT=CON:↩
I TYPE A CONTROL-Z TO STOP TYPING.↑Z
A⟩
```

The device names used with PIP describe *logical devices* that may exist in your system. CP/M can only remember four logical devices at a time: the console display and keyboard (CON:), the reader or modem input (RDR: in CP/M-80, AXI: in CP/M-86), the punch or modem output (PUN: in CP/M-80, AXO: in CP/M-86), and the "listing" device (LST:), usually a printer.

You must use these devices properly in PIP statements. Remember, PIP statements take the form:

```
PIP destination = source ↩
```

The CON: device can be a source (input) or destination (output), but the other devices are usually one or the other (RDR: or AXI: is used only as a source input device, PUN: or AXO: is used only as a destination output device, and LST: is only used as a destination output device).

For more information about physical devices, see "Using STAT" later in this article.

### Using PIP Options

The PIP program lets you specify options in brackets with the source filename or device, or with each source filename in a concatenation operation. Some options let you modify the contents of the file while in transit to the destination file or device. Useful ones for typical PIP operations are the ***[Gn]***, ***[N]***, ***[P]*** and ***[V]*** options.

The ***[Gn]*** option lets you copy a source file located in another user area of the disk. Hard disk systems and multiple-user systems can have separate *user areas* on the disk to isolate files from other users. The USER command will move you to a different user area. User areas are numbered from zero to fifteen.

To copy a file from another user area into your own area, use the ***[Gn]*** option with the other user area number for ***n***. Example 11 shows a PIP command copying SAMPLE.TXT from user area 2 of drive B to drive A.

**Example 11.**

```
A⟩PIP A:=B:SAMPLE.TXT[G2]↩
```

The ***[N]*** and ***[P]*** options are explained briefly in the "CP/M Summary" in this issue. The ***[V]*** option verifies that the copy made is a correct one. The ***[V]*** option compares the copied data with the source data before finishing the copy operation. Example 12 shows two PIP operations: the first copies a file and verifies that the copy is accurate, and the second sends a file to the printer and changes the lines-per-printed-page to 50 lines (otherwise, PIP uses 60 lines per page).

**Example 12.**

```
A⟩PIP B:=A:FRAGILE.TXT[V]↩
A⟩PIP LST:=TEXT101.TXT[P50]↩
```

**If PIP is Aborted...**

You may, at some time, get the nasty message **PIP ABORTED** or a similar one. You may get no message at all, especially if the power fails in the middle of a PIP operation. Do not worry. PIP never alters the source file, nor does it change a pre-existing destination file until the entire copy operation is finished.

PIP does this by creating a temporary file, with the ".$$$" extension, to hold the copied data until the copy is finished. PIP's ".$$$" file is not deleted until the copy is finished and the destination file is updated (or created). Therefore, when you are updating an old file by copying a new version into it, you need to have *more than twice the size* of the new version of available space on your destination disk before you can do the operation.

If PIP is aborted for any reason, the ".$$$" file will most likely be on your destination disk. It may be empty, but it may also contain a partial copy. Either way, you should try the PIP operation again, after checking to make sure you have enough space on your destination disk for *at least one extra copy* of the file you are copying. If a ".$$$" file still exists after multiple PIP operations, check to make sure the PIP operations were successful.

You can delete any ".$$$" files that may exist after aborted PIP operations if you intend to use a different destination disk.

A complete PIP tutorial is beyond the scope of this article (*A complete PIP tutorial is planned for a future issue of* The User's Guide — *ed.*). The "CP/M Summary" in this issue summarizes the PIP options.

## *Displaying Files*

You can display the contents of a text file or source program (any file containing ASCII characters) with the TYPE command. The following example displays SAMPLE.TXT (the text in SAMPLE.TXT comes from Example 10 in the previous section on PIP):

```
A⟩TYPE SAMPLE.TXT↩
I TYPE A CONTROL-Z TO STOP TYPING.
A⟩
```

If you're displaying a large file, the display may move too fast for reading. To temporarily stop the display, hold down your CONTROL key and type ***S*** (↑***S***). To continue the display, type CONTROL-S (↑***S***) again, or any other key. To stop the display altogether, type a CONTROL-C (hold down your CONTROL key and type ***C*** (↑***C***).

## *Renaming Files*

To rename any file, use the REN command as shown (use of the "=" sign is similar to PIP):

```
A⟩REN NEWNAME.TXT=OLDNAME.TXT↩
```

You always specify the new name first, followed by the equal sign (=), then the old name. You get an error message if the new name you specify is the name of an existing file, or if the old name does not exist in the current directory.

You cannot rename a file to have a different drive prefix. If you specify a drive prefix with either name, you must use the same drive prefix with the other name.

## *Erasing Files*

To erase one or more files, use the ERA command. You can specify an ambiguous filename to match several files, but *be careful* — first use the DIR command with the ambiguous filename to see which filenames match it. Once you ERA a file, you cannot recover it without a special disk file recovery program (not supplied with standard CP/M).

The following examples demonstrate use of the ERA command. The last example (`ERA *.*↩`) erases *all* files on the disk in drive B, but first asks for confirmation (waits for you to type ***Y*** for yes or ***N*** for no, and press RETURN). Do not type ***Y*** if you want to save the files.

```
A⟩ERA SAMPLE.TXT↩
A⟩ERA *.BAK↩
A⟩B:↩
B⟩ERA *.*↩
ALL FILES (Y/N)?Y↩
```

If you get the error message **File is R/O**, the file you are trying to erase is set to "read-only" and must be reset to "read/write" before you can erase it (see "File Attributes"). If you separate disk files into user areas, the ERA command will only erase files in your user area.

## *User Areas*

The ability to separate files into distinct user areas on a disk is provided as a convenience for separating files on a large hard disk. CP/M doesn't keep the files in separate areas — it merely adds a user area number to the file's name and information. When you use the DIR command in user area 1, you only see the files in user area 1.

Single-user systems rarely need the protection of user areas. User area zero is the assumed user area for all files, unless you change the current user area with the USER command, and create files in the other user area.

To change the current user area, type ***USER*** followed by the number of the user area:

```
A⟩USER 1↩
```

Some MP/M and CP/M systems display the prompt **0A⟩** for user area 0, and **1A⟩** for user area 1.

To erase files in another user area, you must change the current user area to that area and then use the ERA command. You can PIP a file from another user area to your area using the ***[Gn]*** option. The following example copies a file from user area 2 to the current user area:

```
A⟩PIP A:=A:SAMPLE.TXT[G2]↩
```

Programs stored in one user area cannot be run from another, unless the program is stored in user area zero and has the SYS attribute. Use the STAT command to give the SYS attribute to programs that are needed by other users, and store those programs in user area 0 so that users in other areas can run them.

## *Using The STAT Utility: System Statistics and Devices*

Using a personal computer often involves managing files and disks in a way that conserves space. The STAT program (STAT.COM supplied with CP/M-80, or STAT.CMD supplied with CP/M- 86) displays statistics on disk size, file size, attributes, and devices.

The STAT displays differ slightly from CP/M-80 to CP/M- 86. The original CP/M-80 versions are shown beside the new CP/M- 86 versions.

The simplest form of STAT is:

**CP/M-80**

```
A>STAT↩
A: R/W, Space: 76k
```

**CP/M-86**

```
A>STAT↩
A: RW, Free Space: 76k
```

This information tells you that the disk in drive A is a disk you can read or write to (it has the **R/W** or **RW** attribute), and that it has 76K bytes of space left on it for more data.

One *byte* is the equivalent of one letter, number, or punctuation symbol. For example, if chapter one of your novel contains 1300 characters, it would occupy approximately 1300 bytes of storage.

### Disk and File Space

The "K" (or "k") is your clue to the measurement of disk and memory space. "K" stands for 1024 bytes, not 1000. (Why? Computers work faster with binary numbers, and 2 is a multiple of 8 and 16, which in turn are multiples of 1024). Therefore, 64K bytes is actually 64 times 1024 bytes. In our example above, we have 76 times 1024 bytes of space left on the disk in drive A.

You don't have to calculate file size by counting characters. A version of the STAT command will tell you the size of any file:

**CP/M-80**

```
A>STAT SAMPLE.TXT↩
Recs        Bytes       Ext      Acc
   5           2k         1      R/W                A:SAMPLE.TXT
Bytes remaining on A: 76k
```

**CP/M-86**

```
A>STAT SAMPLE.TXT↩
Drive A:                         User 0
Recs     Bytes     FCBs        Attributes                  Name
   5        2k        1          Dir RW             A:SAMPLE.TXT
A: RW, Free Space: 76k
```

For simple file calculations, use the **Bytes** figure (2k) and compare it to the number of bytes remaining on disk — 76k. We could increase the size of SAMPLE.TXT to be 30 times larger than its present size, and it would still fit on the disk in drive A.

The other figures tell you other things:

- **Recs** is the number of 128-byte *records* in the file (a *record* is a logical collection of bytes). CP/M always stores data in 128-byte records, even if your file has less than 128 bytes.

- **Ext** tells you the number of *extents* occupied by the file. Extents are 16k bytes long, and correspond to the number of directory entries for the file. CP/M-86 labels this column with **FCBs**, which stands for File Control Blocks, which also correspond to the number of directory entries for the file.

If you type the ***$S*** option (***SIZE*** in CP/M-86), STAT will also display a column labeled **Size**. This figure is the number of virtual records (filled and unfilled) in the file. This figure will be the same as **Recs** in a sequential file, but may differ in a random file.

### File Attributes

The **Acc** (or **Attributes**) column tells you the access attribute of the file. In CP/M versions 2.0 and newer, and in CP/M-86, you can assign *attributes* to files that prevent inadvertent deletions or overwrites.

For example, you can use STAT to assign the ***$R/O*** (read-only) attribute to a file, which prevents you from deleting the file or writing new information to the file (including copying to the file). The ***$R/W*** attribute allows both deleting and writing operations.

Once again, there are differences in nomenclature between CP/M-80 and CP/M-86. The attributes in CP/M-80 are ***$R/O***, ***$R/W***, ***SYS*** and ***DIR***. The corresponding attributes in CP/M-86 are ***RO***, ***RW***, ***SYS*** and ***DIR***.

The ***$SYS*** or ***SYS*** attribute makes the file a *system* file, whose name does not appear in a DIR command (CP/M-86 provides DIRS to see names of system files). The ***$DIR*** attribute is the opposite of ***$SYS***, used to make a system file a normal file whose name does appear in a DIR command.

When user areas are used, a program with the ***$SYS*** attribute in user area 0 can be run from other user areas.

The following example shows two attribute assignments in both CP/M-80 and CP/M-86 — SAMPLE.TXT is set to read-only, and WS.COM is set to be a system file:

**CP/M-80**

```
A⟩STAT SAMPLE.TXT $R/O↵
SAMPLE.TXT SET TO R/O
A⟩STAT WS.COM $SYS↵
SAMPLE.TXT SET TO SYS
```

**CP/M-86**

```
A⟩STAT SAMPLE.TXT RO↵
SAMPLE.TXT set to RO
A⟩STAT WS.COM SYS↵
SAMPLE.TXT set to SYS
```

SAMPLE.TXT is now a "read only" file that cannot be deleted or written to without an error message. We recommend that you use the read-only attribute for ".COM" or ".CMD" files (command files or program files). WS.COM is set as a system file so that it does not show up in DIR displays. It can also be stored in user area 0 of a disk, and be used from different user areas of that disk.

### Disk Attributes

STAT can display information about disks in other drives. For the disk in drive B, type the following command:

**CP/M-80**

```
A⟩STAT B:↵
Bytes remaining on B: 196k
```

**CP/M-86**

```
A⟩STAT B:↵
B: RW, Free Space: 196k
```

STAT with the ***DSK:*** option gives you disk statistics:

**CP/M-80**

```
     A⟩STAT DSK:↵
    A:Drive Characteristics
65536:128 Byte Record Capacity
 8192:Kilobyte Drive Capacity
  128:32 Byte Directory Entries
    0:Checked Directory Entries
 1024:Records/Extent
  128:Records/Block
   58:Sectors/Track
    2:Reserved Tracks
```

**CP/M-86**

```
     A⟩STAT DSK:↵
    A:Drive Characteristics
65536:128 Byte Record Capacity
 8192:Kilobyte Drive Capacity
  128:32 Byte Directory Entries
    0:Checked Directory Entries
 1024:128 Byte Records/Directory Entry
  128:128 Byte Records/Block
   58:128 Byte Sectors/Track
    2:Reserved Tracks
```

You can also assign the ***R/O*** or ***RO*** (read-only) attribute to an entire disk using STAT. To make the disk in drive B read-only (so that no one can delete files or copy new files to it), type this command:

| CP/M-80 | CP/M-86 |
|---|---|
| `A>STAT B:=R/O↩` | `A>STAT B:=RO↩` |

After setting an entire disk to read-only with ***R/O*** (or ***RO***), any PIP or write operation to the disk causes the error message **BDOS ERR ON d:R/O**. If you press any key in CP/M-80, the disk reverts back to being a normal readable and "write-able" disk (in CP/M-86, use CONTROL-C to change the disk back to a "write-able" disk).

The read-only attribute for a disk does not protect the disk in the same way as the write-protect feature on the floppy disk itself. In CP/M-80, the disk automatically reverts back to being a read-write disk after you press any key. Obviously, this mechanism is simply a reminder that you once used STAT to set this disk as read-only. In CP/M-86 you can easily change the read-only attribute to read-write by simply resetting the system or using a CONTROL-C (***↑C***) command.

If you want to protect a floppy disk more than temporarily, use the physical write-protect features of the disk. Eight-inch floppy disks have a notch that must be covered in order to write to the disk (or copy to the disk); therefore, eight-inch disks are protected if the notch is uncovered. Most five-inch floppy disks have a write-protect notch that must be *covered* in order to protect it from writes. If you are confused, ask your floppy disk dealer for the right procedures to protect and un-protect your disks.

### Device Assignments

CP/M can remember four devices at any one time: the CON: (console and keyboard) device, the RDR: (AXO:) device (usually a modem), the PUN: (AXI:) device (usually a modem), and the LST: (printer) device.

CP/M lets programmers create more than four *physical device drivers* that can control the actual devices. However, since CP/M can only remember four at a time when running, the programmer must choose four physical device drivers by name, and assign them with the STAT command to the logical names CON:, RDR: (or AXI:), PUN: (or AXO:), and LST:.

The following STAT command assigns the physical device driver for a special printer (***UL1:*** for user-defined list device #1) to the logical ***LST:*** device:

```
A>STAT LST:=UL1:↩
```

To see what physical devices are assigned to the logical devices in your currently-running version of CP/M, type the following command:

```
A>STAT DEV:↩
```

To see what physical device names can be used in STAT assignments, substitute the word ***VAL:*** for ***DEV*** in the above example.

A STAT tutorial is also beyond the scope of this article. The STAT options and device names are summaried in the "CP/M Summary" in this issue.

## *SUBMIT Utility:*

### *Submitting a Batch of Commands*

One recurring activity for those who use text editing or word processing programs is to make copies of text files and erase the temporary ".BAK" files that are created by the text editing programs.

If your backup disk is in drive B and your text files are in drive A, you can perform this activity by typing two commands:

```
A>PIP B:=A:*.TXT↵
```
(Copy all text files to drive B.)
```
A>ERA *.BAK↵
```
(Erase all ".BAK" files in drive A.)

If you need to repeat these commands a lot, you can create a file to hold these commands, and submit the file for execution in order to execute them. (We use two commands in this example, but you will want to use the SUBMIT facility to repeat execution of many commands, to avoid re-typing them.)

1. Create a text file that has a ".SUB" extension rather than a ".TXT" extension, and type the commands into the file as text. We recommend that you use a suitable text editing program such as WordStar; however, the following instructions show how to use the free text editor supplied with CP/M: the ED (ED.COM) program:

```
A>ED CLEANUP.SUB↵
```
(The ED program displays the following prompt:)
```
:*
```
(Now type the ***I*** command to insert the text:)
```
:*I↵
1:PIP B:=A:*.TXT↵
2:ERA A:*.BAK↵
3:
```
(Now press the CONTROL key and type ***Z*** to stop inserting text:)
```
3:↑Z↵
2:*
```
(Now use the ED program's ***B#T*** command to display the edit buffer:)
```
2:*B#T↵
1:PIP B:=A:*.TXT
2:ERA A:*.BAK
2:*
```
(Now type the ***E*** command to end the ED session:)
```
2:*E↵
```
(You now have the file CLEANUP.SUB in drive A.)

2. With CLEANUP.SUB in drive A, type the following command:

```
A>SUBMIT CLEANUP↵
```

The commands now execute automatically. However, the real power of SUBMIT is the ability to use *parameters* with commands that can be assigned values when typing the SUBMIT command.

For example, to make the CLEANUP.SUB program work for any type of file, including all files on the disk, you would substitute the parameter ***$1*** for the filenames in the CLEANUP.SUB file:

```
PIP B:=A:$1
ERA A:$1
```

```
A>ED CLEANUP.SUB⏎
```

(The ED program displays the following prompt:)

```
:*
```

(Type the ***#A*** command to bring in the contents of CLEANUP.SUB:)

```
:*#A⏎
1: (Now type the #S command to substitute new text for old text throughout the file:)
1:*#S*↑Z$1⏎                                              (Substitute "$1" for "*")
```

(Now use the ED program's ***B#T*** command to display the edit buffer:)

```
1:*B#T⏎
1:PIP B:=A:$1.TXT
2:ERA A:$1.BAK
2:*
```

(Now type the ***E*** command to end the ED session:)

```
2:*E⏎
```

(You now have an edited version of the file CLEANUP.SUB in drive A.)

When submitting this file to the SUBMIT utility, you would also type the name of the file, or a filename match, to be substituted for **$1** in the CLEANUP.SUB file:

```
    A>SUBMIT CLEANUP SAMPLE⏎
```

SUBMIT creates a temporary file called $$$.SUB to hold the commands with the substitution performed, and then executes the commands automatically:

```
    PIP B:=A:SAMPLE.TXT                          ("SAMPLE" replaces "$1")
    ERA A:SAMPLE.BAK
```

You could SUBMIT the CLEANUP file with a filename match rather than a single filename, and perform the cleanup operation on all the ".TXT" and ".BAK" files on the disk:

```
    A>SUBMIT CLEANUP *⏎
```

## *Explore CP/M ... Or Relax and Use It*

It's not hard to believe that most of you beginners made it this far. You really do not have to learn everything about CP/M to run it or use it to run application programs.

You are now armed with just enough information, and with an adequate supply of buzz words and phrases, to deal competently with computer salespeople, service technicians, CP/M application programmers, and systems consultants.

Your experience is also enhanced with shortcuts and techniques for performing complex system operations. In no time you'll be "batching" your commands into SUBMIT files, "PIP-ing" files to and from far away places, RENaming and ERAsing files and programs, checking disk and file STATistics, and searching DIRectories for important files.

You also have a choice: to continue exploring the CP/M system and eventually learn how to "patch" programs and fix "bugs" with DDT and use other CP/M utilities, or to settle back comfortably with CP/M at your control, and move on into serious application programs. The "Impatient User's Guide to CP/M" in this issue should help you locate specific instructions and rules for the CP/M commands you've learned, and for commands and options you haven't yet explored.

*An Impatient User's Guide...*

# CP/M Quick Reference

*A guide for CP/M-80 and CP/M-86*

by Tony Bove & Cheryl Rhodes

☞ NOTE: In this guide, the ↑ symbol stands for the CONTROL (CTRL, CNTL or ALT) key, and the ⏎ symbol stands for the Carriage Return (RETURN, CR or ENTER) key. We use ***this typeface*** to show what you should type, with ***UPPER CASE*** letters for keywords and ***lower case*** letters for words or values you must supply when typing the commands. The *italic lowercase* letters show optional words or values you can supply. Finally, we use **THIS TYPEFACE** to show messages displayed by programs or by the system.

CP/M stood for "Control Program/Monitor" when it was originally designed; its more popular meaning is "Control Program for Microcomputers."

CP/M is an operating system from Digital Research, Inc. that can be used with many different computers that are based on the Z80 microprocessor (Zilog) or based on the 8080, 8085, 8086 or 8088 microprocessors (Intel). Many different microcomputers are based on these microprocessors.

The primary use of CP/M is to control your computer in order to run application programs. There are three types of CP/M commands:

- CONTROL key combinations (such as ↑***C***, or CONTROL-C) used to restart the system, or perform command line editing and other functions.

- Built-in commands (such as DIR) that are part of the system software.

- System programs (also known as "transient commands") that reside on disk (such as PIP.COM or PIP.CMD).

CP/M is supplied on one floppy disk, which can also contain other programs that run in a CP/M system. This floppy disk is called the *system disk*. The system software resides on the first two tracks of the system disk, and other programs, including some CP/M commands, occupy other tracks.

### *Filenames and the DIR Command*

The DIR command displays a directory listing of *filenames*:

```
A⟩DIR⏎
```

Here's a summary of the rules governing filenames:

```
d:filename.ext
```

- The ***filename*** is a unique name for the file (up to eight characters).
- The optional ***.ext*** is a typical three-character extension used to indicate the type of file. You can use fewer than three characters.
- A filename can have a name with no extension, or an extension with no name; the unnamed portion is set to blanks.
- The optional ***d:*** is a disk drive letter followed by a colon — to specify a file on a disk other than the current disk indicated in the prompt.

You can also use the DIR command to find a file in the directory listing by specifying the filename with DIR. You must specify the *entire* filename, including the extension:

```
A⟩DIR PIP.COM⏎
```

Drive A is indicated by the prompt **A⟩**, drive B is indicated by the prompt **B⟩**, and so on. If you have more than one disk drive, your second drive is called drive B, your third drive C, etc.

If you have a disk in drive B, you can see the directory listing for the file SAMPLE.TXT on the disk in drive B by typing the following command (next to the displayed **A⟩** prompt):

```
A⟩DIR B:SAMPLE.TXT⏎
```

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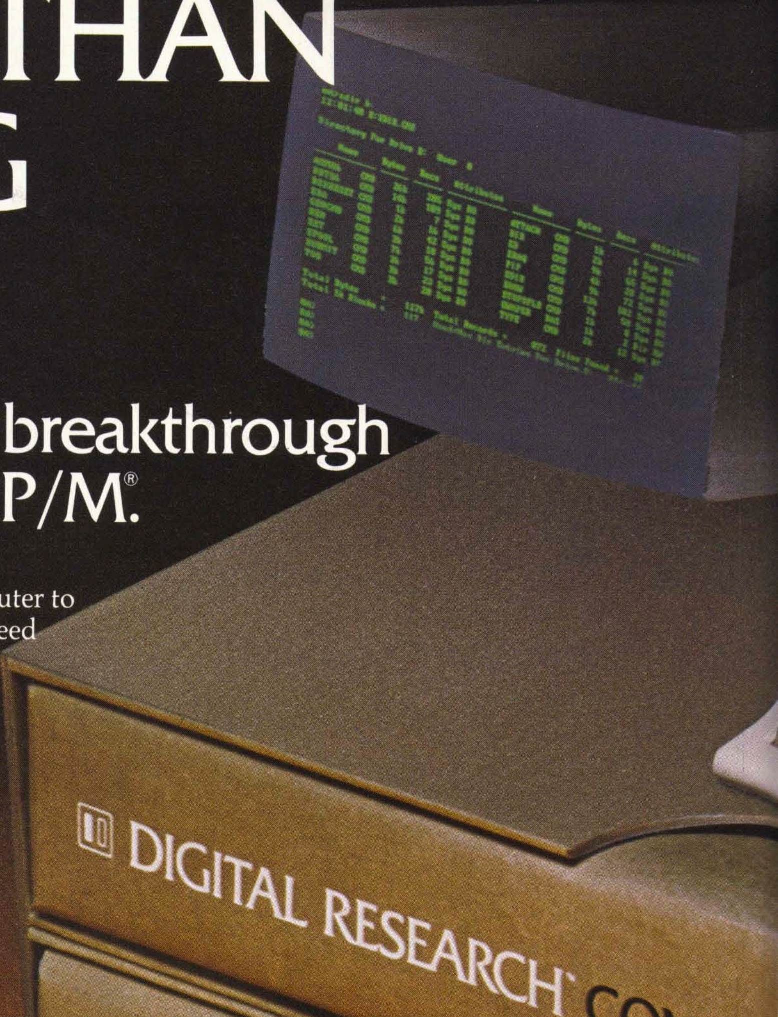

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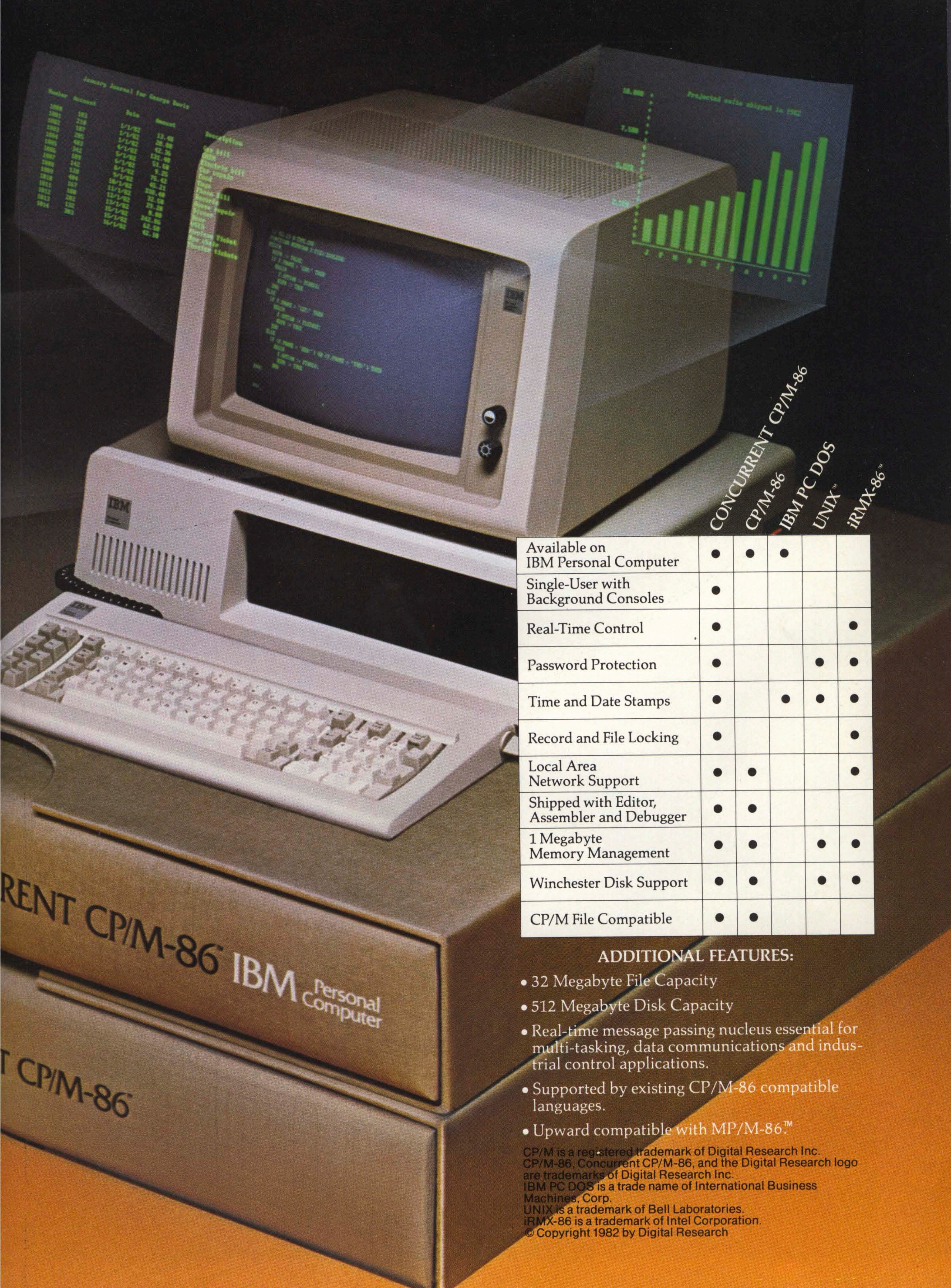
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|---|---|---|---|---|---|
| Available on IBM Personal Computer | ● | ● | ● | | |
| Single-User with Background Consoles | ● | | | | |
| Real-Time Control | ● | | | | ● |
| Password Protection | ● | | | ● | ● |
| Time and Date Stamps | ● | | ● | ● | ● |
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| Local Area Network Support | ● | ● | | | ● |
| Shipped with Editor, Assembler and Debugger | ● | ● | | | |
| 1 Megabyte Memory Management | ● | ● | | ● | ● |
| Winchester Disk Support | ● | ● | | ● | ● |
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### *Inserting a Disk*

In most CP/M systems, you use a system disk in drive A to hold your system and application programs, and a data disk in drive B to hold your data and text files. These disks must be *formatted* to be used with your system; otherwise, your system will not recognize the disk, and the computer will probably "hang" as if in a daydream, waiting for you to insert a proper disk (or to reset the system).

In most cases, after you insert a formatted disk in a drive, or replace a disk in a drive with a different disk, you should warn CP/M by typing ↑***C*** (hold down your CONTROL key and type a ***C***). This tells CP/M how to put data on the new disk.

There are times, when using programs like PIP or FORMAT, where you can insert a different disk and not type a CONTROL-C. However, if you try to put data on the new disk, you may get an error message (such as **Bdos Error On B: R/O**). You should then type a CONTROL-C.

### *Switching Drives*

CP/M will always look in drive A for a file, unless you:

- put a ***B:*** prefix on the filename to tell CP/M to look in drive B, or
- *switch to drive B.* Simply type the drive prefix as a command:

```
A>B:↵
B>
```

A DIR command typed after the **B>** prompt displays the entire directory for the disk in drive B. To switch to drive C (if you have one), type ***C:*** followed by RETURN. To switch to drive A, type ***A:*** followed by RETURN.

### *Formatting Disks*

A program called FORMAT or INIT (for "initialize") is usually supplied with your system. When you format a disk, the system wipes out any information already on the disk and prepares the disk to receive new information (organizes the disk's sectors and tracks). After formatting, the disk is a CP/M disk that cannot be used in a non-CP/M system unless it is re-formatted for *that* system.

If you prepare a new or recycled eight-inch disk in the standard CP/M *single-density single sided* format, it should be usable in other CP/M systems that use eight-inch disk drives.

The FORMAT and INIT programs are different for each type of computer. Consult your manual, or ask your dealer.

### *Copying the System Disk*

Customized CP/M-80 systems may have a program to use to copy all tracks of a disk. This is usually the easiest way to copy the system tracks to another disk. CP/M-86 systems provide COPYDISK for this purpose; uncustomized CP/M-80 systems provide (at least) SYSGEN.COM and PIP.COM. In all cases (except customized programs), you must format a new disk to be of the same type (single or double density, single or double sided) as the disk you are copying.

#### CP/M-86: COPYDISK Utility

COPYDISK (the COPYDISK.CMD program) copies all tracks from one disk to another disk:

```
A>COPYDISK↵
Enter Source Disk Drive (A-D) ?A↵
Destination Disk Drive (A-D) ?B↵

Copying disk A: to disk B:
Is this what you want to do (Y/N) ? Y↵
```

If you have a single drive system, the COPYDISK program will tell you to replace your "source" disk (the original) with the "destination" disk (your new copy). At the end of the COPYDISK operation, the program asks if you want to make another copy. Answer ***Y*** if you do, or ***N*** if you want to return to CP/M.

#### CP/M-80: SYSGEN & PIP

**For Double Drive Systems**

Most CP/M-80 systems have at least two disk drives. If you have a system with only one, skip to "Single Drive Systems" first before reading these instructions.

Insert into drive B the new disk to receive the copy, and *format* the new disk if your CP/M system requires disk formatting.

The SYSGEN program supplied only with CP/M-80 systems (SYSGEN.COM in the DIR listing for drive A) will place a copy of the system onto your new backup disk:

```
A>SYSGEN↵
```

SYSGEN asks for the "source" drive with the system disk you are using; since your system disk is normally in drive A, you can type ***A*** followed by the RETURN key. Note, however, that if you modified your system and the modified version is running (i.e., it is in memory) but not yet stored on the disk in drive A, *you must skip this question* by pressing only the RETURN key.

SYSGEN then asks for the "destination" drive with the disk to receive a copy of the system. Type ***B*** for drive B (the drive with the disk to hold the copy):

```
A>SYSGEN ↵
SOURCE DRIVE NAME
(OR RETURN TO SKIP):A↵
SOURCE ON A:, THEN TYPE RETURN ↵
FUNCTION COMPLETE
DESTINATION DRIVE NAME
(OR RETURN TO REBOOT): B↵
DESTINATION ON B:, THEN TYPE RETURN ↵
```

When SYSGEN completes its function, it displays the message:

```
FUNCTION COMPLETE
```

If you want to make more copies, insert another new disk into drive B and type ***B*** to the following question. If you are finished copying the system, press RETURN to "reboot" the system:

```
DESTINATION DRIVE NAME
(OR RETURN TO REBOOT): ↩
A⟩
```

SYSGEN copied only the *system* software to the backup disk. Now you have to copy all of the *programs* and other files from the system disk to your new backup copy, using PIP:

```
A⟩PIP B:=A:*.*↩
```

This command copies all the files on the disk in drive A to the disk in drive B. If you employ user areas, this command only copies the files in user area 0 (see "User Areas").

### CP/M-80: SYSGEN For Single-Drive Systems

In the absence of a custom program from your dealer or computer manufacturer that copies the system tracks with the rest of the disk, use SYSGEN as described above, with the following changes to the procedures:

After typing ***A*** for the "source" drive, and the RETURN key twice, the **FUNCTION COMPLETE** message should appear, followed by the question about your "destination" drive. Take out your system disk and replace it with the new disk to be the backup. Answer by typing ***A*** as the "destination" disk, followed by two RETURN keys, and SYSGEN should copy the system onto the new backup disk.

To copy all files from the system disk to your new backup disk, you need a special customized program for your system, since PIP (described above) only works with systems with more than one disk drive.

## *CONTROL Key Combinations*

The CONTROL key (sometimes called CTRL, CNTL or ALT) can be used in combination with another key to perform command line editing or other functions. Check the CP/M summary for a list of all of the CONTROL key combinations and the functions of special keys. Here are some that are used often:

| | |
|---|---|
| ↑***C*** | Alert CP/M to the fact that you just inserted a new disk or replaced a disk in a drive. Also used to stop ("abort") running some programs (not WordStar). |
| ↑***P*** | Turn on (or off) your "list" device, usually your printer, to "echo" (repeat) everything that occurs on your screen and everything you type. Use ↑***P*** to turn *off* this function after turning it on with ↑***P***. |
| ↑***R*** | Repeat the comand line without rubbed-out characters. |
| ↑***S*** | Stop long displays on your screen (often used with the TYPE command). Continue displaying ("scrolling") by typing any key except ↑***C***. |
| ↑***U*** or<br>↑***X*** | Delete the command line without sending it to CP/M. |
| RETURN<br>↩ | Send the line to CP/M as a command to be acted upon, and move the cursor down to the beginning of the next line. |
| RUBOUT | Delete a character and re-display the "rubbed-out" character. |

## *Filename Matches*

CP/M provides a way to specify several files at once in some commands. A *filename match* is a partial filename with special symbols to match arbitrary characters of a filename. They are also known as *ambiguous filenames*.

The special symbols are ***** to match any number of characters, and ***?*** to match one character. See the CP/M tutorial in this issue for a table that shows ambiguous filenames and the names they match.

## *Copying Non-System Disks*

Some CP/M systems have a customized copying program that copies your disks faster or easier than the conventional way using PIP. If you have only one disk drive, you must have such a program. Consult your manual.

☞ NOTE: CP/M-86 users have the new COPYDISK program that copies all the information on one disk to another disk, including the system tracks if they are present on the disk being copied (the *source* disk). Type ***COPYDISK*** and press RETURN, and the program asks for the *source* and *destination* drives. The source drive contains the disk to be copied, and the destination drive contains the disk to receive the copied information.

### Using Three Disk Drives

Insert the disk to be copied into drive B (the original, or source disk). Insert the receiving disk into drive C (your third drive). Consult your manual for the proper formatting instructions, and format the disk in drive C.

After formatting, type the command ***C:*** and press your RETURN key (ENTER or CR on some keyboards). When you see the **C**⟩ prompt, hold down the CONTROL (CNTL or CTRL) key and type a ***C***. The ***C***⟩ prompt should reappear. Type the following commands (each followed by RETURN):

```
C⟩A: ↩
A⟩PIP C:=B:*.*↩
```

### Using Two Disk Drives

Insert the receiving disk (the one to hold backup copies) into drive B. Consult your manual for the proper formatting instructions, and format the disk in drive B. Type the command ***B:*** and press your RETURN key (ENTER or CR

TURN key does not stop input to the file, nor does it transmit the required line feed code to move the cursor to the next line. Stop input by typing a CONTROL-Z (↑**Z**):

```
A>PIP TEXT.TXT=CON:↵
```

### *Displaying Files*

You can display the contents of a text file or source program (any file containing ASCII characters) with the TYPE command:

```
A>TYPE SAMPLE.TXT↵
```

To temporarily stop the display, type CONTROL-S (↑**S**). To continue the display, press any key.

### *Renaming Files*

To rename any file, use the REN command as shown (use of the = sign is similar to PIP):

```
A>REN NEWNAME.TXT=OLDNAME.TXT↵
```

You cannot rename a file to have a different drive prefix.

### *Erasing Files*

To erase one or more files, use the ERA command:

```
A>ERA FREE.BAS↵
```

The following examples erase all ".BAK" files on drive A, and then all files on drive B:

```
A>ERA *.BAK↵
A>B:↵
B>ERA *.*↵
ALL FILES (Y/N)?Y↵
```

If you get the error message **File is R/O**, the file you are trying to erase is set to "read-only" and must be reset to "read/write" before you can erase it (see "File Attributes").

ERA only erases files in your user area. If you use more than one user area on a disk, you have to move to those user areas to erase files in them.

### *User Areas*

Single-user systems rarely need the protection of user areas. User area zero is the assumed user area for all files, unless you change the current user area with the USER command, and create files in the other user area.

To change the current user area, type ***USER*** followed by the number of the user area:

```
A>USER 1↵
```

To erase files in another user area, you must change the current user area to that area and then use the ERA command. You can PIP a file from another user area to your area using the ***[Gn]*** option. The following example copies a file from user area 2 to the current user area:

```
A>PIP A:=A:SAMPLE.TXT[G2]↵
```

Programs stored in one user area cannot be run from another, unless the program is stored in user area zero and has the SYS attribute. Use the STAT command to give the SYS attribute to programs that are needed by other users, and store those programs in user area 0 so that users in other areas can run them.

### *Disk and File Sizes*

Use the STAT.COM program (STAT.CMD in CP/M-86) to display the available disk space in multiples of 1024 (or "K") bytes:

```
A>STAT↵
A: R/W, Space: 76k
```

The display means the disk in drive A is a disk you can read or write to (it has the **R/W** attribute). It has 76K bytes of space left on it for more data (roughly 77,800 characters).

Use STAT with a filename or filename match to display the sizes of files:

```
A>STAT SAMPLE.TXT↵

Recs  Bytes  Ext  Acc
   5     2k    1  R/W        A:SAMPLE.TXT

Bytes remaining on A: 76k
```

Use a filename match to see the sizes of several files:

```
A>STAT *.TXT↵
```

The columns in the STAT display are explained in the CP/M tutorial in this issue.

#### File Attributes

The **Acc** column tells you the access attribute of the file. In CP/M versions 2.0 and newer, and in CP/M-86, you can assign *attributes* to files that prevent inadvertent deletions or overwrites. These attributes are:

Read-Only
> The **R/O** or **RO** attribute prevents you from deleting the file or writing new information to the file (including copying to the file).

Read-Write
> The **R/W** or **RW** attribute allows both deleting and writing operations.

System
> The **SYS** attribute makes the file a *system* file, whose name does not appear in a DIR command (CP/M-86 provides DIRS to see names of system files). You must use the ***[R]*** parameter with PIP to copy system files. When user areas are used, a program with the **SYS** attribute in user area 0 can be run from other user areas.

on some keyboards).

When you see the **B**〉 prompt, hold down the CONTROL (CNTL or CTRL) key and type a ***C***. The **B**〉 prompt should reappear. Type the command ***A:*** (followed by RETURN), wait for the **A**〉 to appear, and then type the command ***PIP*** (followed by RETURN). An asterisk (*) should appear.

Take your system disk out of drive A and replace it with the original (source) disk to be copied. Type the following command (followed by RETURN):

```
*B:= *.*↵
```

When it finishes, take your receiving disk out of drive B. Take the original disk out of drive A, and replace it with the system disk. *Do not type anything until you've inserted a system disk!* After inserting the system disk, press the RETURN key. The PIP program stops, and the familiar **A**〉 prompt should reappear.

**Using a Hard Disk**

Systems with a hard disk can make the hard disk act as any drive or set of drives. For these instructions, we assume the hard disk is acting as drive A, and that a floppy disk drive is acting as drive B. This makes sense, because the hard disk should be the most active one, and all system files should be located on it, as well as all application programs.

To copy files from the hard disk, format a new or recycled disk in drive B and use PIP:

```
A〉PIP B:= *.*↵
```

This command will copy *only the files in your current user area* to the same user area number on drive B. If you don't use *user area numbers* to segregate files on disk, files are all considered to be in user area zero (the default).

To copy files from one user area to another, add the ***[Gn]*** parameter, where ***n*** is the user area you are copying from. Move to the user area to receive the copies (with the USER command), and then use PIP:

```
0B〉USER 1↵
1B〉PIP A:=B:*.*[G0]↵
```

This example copies the files from user area 0 on drive B (using the ***[G0]*** parameter) to user area 1 on drive A, because the PIP operation was started from user area 1 (as indicated by the **1B**〉 prompt).

☞ NOTE: CP/M-86 lets you specify the ***[Gn]*** parameter on the destination side of the = sign, so that you can copy *to* another user area from the current user area.

## *PIP: Copying Files and Disks*

Use the PIP.COM program supplied with CP/M to copy files to other disks, or to copy entire disks, in a system with two or more disk drives. If you are running CP/M-86, use the COPYDISK command to copy entire disks at a time.

You can type a transfer expression following the keyword ***PIP*** on the command line, or you can execute PIP by typing ***PIP*** by itself, and when you see PIP's * prompt, you type several PIP transfer expressions to perform several operations in a row.

```
d〉PIP d:destiny=d:source↵

d〉PIP↵
*d:destiny=d:source↵
*d:destiny=d:source↵
*↵
d〉
```

**Copying Files**

Copy the *original* file to the *copy* file on the same disk:

```
A〉PIP COPY.TXT=ORIGINAL.TXT↵
```

Copy SOURCE.BAS on the disk in drive A to DESTINY.BAS on the disk in drive B, creating a new DESTINY.BAS or overwriting the old one:

```
A〉PIP B:DESTINY.BAS=A:SOURCE.BAS↵
```

Copy ORIGINAL.TXT in drive A to drive B, using the same filename for the copy in drive B:

```
A〉PIP B:=A:ORIGINAL.TXT↵
```

**Copying An Entire Disk:**

Copy the entire disk in drive A to drive B (user areas not used):

```
A〉PIP B:=A:*.*↵
```

To copy an entire disk where files are grouped into user areas, use the ***[Gn]*** parameter, substituting for each ***n*** the number of each user area in use on the source disk. Here's the PIP command for copying from user area number 2:

```
A〉PIP B:=A:*.*[G2]↵
```

**Copy Files to the Printer**

Copy text files to your LST: device (usually a printer):

```
A〉PIP LST:=B:SAMPLE.TXT↵
```

**Concatenate Files**

Add the contents of FILE3 to the end of FILE2, and FILE2 to the end of FILE1, and store in RESULT without disturbing FILE1, FILE2 or FILE3:

```
A〉PIP RESULT=FILE1,FILE2,FILE3↵
```

**Copy Typed Input to File**

Copy text as you type it into a file. Use of the RE-

Directory

The **DIR** attribute is the opposite of **SYS**, and is used to make a system file a normal file whose name does appear in a DIR command.

To assign an attribute to a file, specify the following attribute after the filename in a STAT command:

**CP/M-80**
***$R/O*** (read-only)
***$R/W*** (read-write)
***$SYS*** (system)
***$DIR*** (directory)

**CP/M-86**
***RO*** (read-only)
***RW*** (read-write)
***SYS*** (system)
***DIR*** (directory)

### Disk Attributes

STAT can display information about disks in other drives:

```
A>STAT B:↩
Bytes remaining on B: 196k
```

STAT with the ***DSK:*** option gives you disk statistics:

```
A>STAT DSK:↩
```

You can also assign the read-only attribute to an entire disk using STAT. To make the disk in drive B read-only (so that no one can delete files or copy new files to it), type ***STAT B:=R/O*** followed by RETURN (in CP/M-86, type ***STAT B:=RO***).

After setting an entire disk to read-only, any PIP or write operation to the disk causes the error message **BDOS ERR ON d:R/O**. If you press your RETURN key, the disk reverts back to being a normal readable and write-able disk. (You must use CONTROL-C in CP/M-86 to change the disk to be write-able).

### Device Assignments

CP/M lets programmers create more than four *physical device drivers* that can control actual devices. However, since CP/M can only remember four at a time when running, the programmer must choose four physical device drivers by name, and assign them to the logical names CON:, RDR: (AXI: in CP/M-86), PUN: (AXO: in CP/M-86), and LST: using the STAT command.

The following STAT command assigns the physical device driver for a special printer (***UL1:*** for user-defined list device #1) to the logical ***LST:*** device:

```
A>STAT LST:=UL1:↩
```

To see what physical devices are assigned to the logical devices in your currently-running version of CP/M, type the following command:

```
A>STAT DEV:↩
```

To see what physical device names can be used in STAT assignments, substitute the word ***VAL:*** for ***DEV*** in the above example.

## *SUBMIT Utility: Submitting a Batch of Commands*

To use SUBMIT with a file of commands, follow these steps:

1. Create a text file that has a ".SUB" extension rather than a ".TXT" extension, and type each command line into the file. The following instructions show how to use the free text editor supplied with CP/M, the ED (ED.COM) program, to type a command file called CLEANUP.SUB that copies all ".TXT" files and erases all ".BAK" files:

```
A>ED CLEANUP.SUB↩
(The ED program displays the following prompt:)
:*
(Now type the I command to insert the text:)
:*I↩
1:PIP B:=A:*.TXT↩
2:ERA A:*.BAK↩
3:
(Now press the CONTROL key and type Z:)
3:↑Z↩
2:*
(Now type the E command to end the ED session:)
2:*E↩
(You now have the file CLEANUP.SUB in drive A.)
```

2. With CLEANUP.SUB in drive A, type the following command:

```
A>SUBMIT CLEANUP↩
```

To make the CLEANUP.SUB program work for any type of file, including all files on the disk, you would substitute the parameter ***$1*** for the filenames in the CLEANUP.SUB file:

```
PIP B:=A:$1
ERA A:$1
```

When submitting this file to the SUBMIT utility, you would also type the name of the file, or a filename match, to be substituted for **$1** in the CLEANUP.SUB file:

```
A>SUBMIT CLEANUP SAMPLE.TXT↩
```

SUBMIT creates a temporary file called $$$.SUB to hold the commands with the substitution performed (***SAMPLE.TXT*** for **$1**), and then executes the commands automatically.

*An Impatient User's Guide...*

# CP/M Summary

## *CP/M-80 and CP/M-86 Commands and Utilities*

by Tony Bove & Cheryl Rhodes

☞ NOTE: In this summary, the ↑ symbol stands for the CONTROL (CTRL, CNTL or ALT) key, and the ↵ symbol stands for the Carriage Return (RETURN, CR or ENTER) key. We use ***this typeface*** to show what you should type, with ***UPPER CASE*** letters for keywords and ***lower case*** letters for words or values you must supply when typing the commands. The *italic lowercase* letters show optional words or values you can supply. Finally, we use **THIS TYPEFACE** to show messages displayed by programs or by the system.

---

### *CONTROL Key Combinations*

| | |
|---|---|
| ↑***C*** | Restart CP/M or perform warm start for a newly inserted disk. Sometimes used to abort programs. In CP/M-86, one CONTROL-C while a program is running aborts the running program. Without a program running, CONTROL-C restarts CP/M (without a disk access) and sets all disk drives to read-write status (**RW**). |
| ↑***E*** | Move cursor to beginning of next line for long command lines. |
| BACKSPACE or ↑***H*** | Delete one character and erase it from the screen (CP/M versions 2.0 and newer). |
| ↑***I*** | Add 8 spaces (tab to next 8th column: 8, 16, 24 ...). |
| LINE FEED or ↑***J*** | Same as the RETURN key (CP/M versions 2.0 and newer). |
| ↑***M*** | Same as the RETURN key. |
| ↑***P*** | Turn on list device to print everything typed or displayed (LST: device is usually your printer). Type ↑***P*** again to turn off list device. |
| ↑***R*** | Repeat the command line. |
| ↑***S*** | Temporarily stop display; continue by typing any character. |
| ↑***U*** or ↑***X*** | Cancel the current line (do not transmit it to CP/M). |
| ↑***Z*** | End input from keyboard during ED or PIP session. |
| ↵ | The RETURN, ENTER, or CR (Carriage Return) key, used to transmit a command line to CP/M and to perform a carriage return and line feed to move cursor to next line. |
| RUBOUT or DELETE | Delete one character and redisplay it. To display corrected commmand line without rubbed-out characters, use ↑***R.*** |

### *CP/M Commands*

The following "built-in" commands do not require program files on disk, since they exist within CP/M itself. You must supply a regular CP/M filename for any ***filename*** (or optional *filename*) below, or an ambiguous filename (using ******* and/or ***?*** symbols) for any optional *filematch*.

***d:*** Change current disk drive to drive ***d***. Type a drive letter for ***d*** followed by a colon (***:***).

***DIR*** $\left\{\begin{matrix} d{:}filename \\ d{:}filematch \end{matrix}\right\}$

Display one or more files.

***DIRS*** $\left\{\begin{matrix} d{:}filename \\ d{:}filematch \end{matrix}\right\}$

Display one or more system files (files with the **SYS** attribute). CP/M-86 only.

***ERA*** $\left\{\begin{array}{l} d{:}\textbf{filename} \\ d{:}\textbf{filematch} \end{array}\right\}$

Erase one or more files.

***REN newname=oldname***

Rename ***oldname*** to ***newname***.

***SAVE** d:**filename***

Save ***n*** pages to *d:**filename***. CP/M-80 only.

***TYPE*** $\left\{\begin{array}{l} d{:}\textbf{filename} \\ d{:}\textbf{filematch} \end{array}\right\}$

Display contents of one or more text files.

***USER n***

Set current user area to user number ***n***.

## *System Programs (Transient Commands)*

These programs must reside in files by the same name with a ".COM" (CP/M-80) or ".CMD" (CP/M-86) extension on the current disk drive (usually the disk in drive A). For example: PIP.COM for the PIP program in CP/M-80, or PIP.CMD in CP/M-86, should be on the disk in drive A or the current drive.

### ASM Assembler (CP/M-80)

***ASM filename**.ahp*

Assemble the program in ***filename***.ASM in the current drive or drive specified by *a*, put the assembled program (***filename***.HEX) in the current drive or drive specified by *h*, and put the listing (***filename***.PRN) in the current drive or drive specified by *p*. If you type ***Z*** for *h* or *p*, ASM will not generate ***filename***.HEX or ***filename***.PRN respectively. If you type ***X*** for *p*, the listing will appear at the console only (no ***filename***.PRN).

### ASM-86 Assembler (CP/M-86)

***ASM86 filename** $Ad Hd Pd Sd Fd*

Assemble the program in ***filename***.A86 (".A86" is assumed unless you supply an extension as part of your ***filename***), put the assembled version in ***filename***.H86, create an annotated listing of the program called ***filename***.LST, and produce a symbol table called ***filename***.SYM. These files are stored on the current disk unless you type one or more of the following *$* options after ***filename*** in the ASM86 command line. To type one or more options, you start by typing the symbol ***$*** The options are:

| | |
|---|---|
| ***Ad*** | Look for the source file on drive ***d***, not the current drive. |
| ***Hd*** | Put the assembled ".H86" file on drive ***d***, not the current drive. |
| ***Pd*** | Put the listing ".LST" file on drive ***d***, not the current drive. |
| ***Sd*** | Put the symbol table ".SYM" file on drive ***d***, not the current drive. |
| ***Fd*** | Select format ***d*** of hexadecimal file: ***D*** for Digital Research, or ***I*** for Intel. |
| ***X*** | An ***X*** for the ***d*** value in any option above (except ***Ad***) causes the output to go to the screen, not to a file. |
| ***Y*** | A ***Y*** for the ***d*** value in any option above (except ***Ad***) causes the output to go to the printer, not to a file. |
| ***Z*** | A ***Z*** for the ***d*** value in any option above (except ***Ad***) causes the output to go to the "byte bucket" (also known as "zero output"), not to a file. |

### COPYDISK Utility (CP/M-86)

***COPYDISK***

Copy all tracks from one disk to another disk.

### DDT Debugger (CP/M-80)

***DDT*** $\left\{\begin{array}{l} d{:}\textbf{filename.HEX} \\ d{:}\textbf{filename.COM} \end{array}\right\}$

Load ***filename.HEX*** or ***filename.COM*** into the program area to debug with DDT commands. If you do not specify ***filename.HEX*** or ***filename.COM***, DDT commands act on whatever is already in the program area.

### DDT Commands

| | |
|---|---|
| ***As*** | Enter assembly language at address ***s***. |
| ***D**s,f* | Display memory at current address or address *s* and continue for 16 lines or to address *f*. |
| ***Fs,f,c*** | Fill memory with hexadecimal byte ***c*** from address ***s*** to address ***f***. |
| ***Gs**,b,c* | Start execution at address ***s***, with optional breakpoints at addresses *b* and *c*. |
| ***G**,b,c* | Start execution at the current address, with optional breakpoints at addresses *b* and *c*. |
| ***G0*** | Properly terminate DDT session, readying program for a SAVE. |
| ***Ifilename*** | Insert ***filename*** into the file control block (005CH) for an ***R*** command. |
| ***L**s,f* | List "disassembled" code from current address or address *s*, and continue for 12 lines or to address *f*. |
| ***Ms,f,d*** | Move block starting at ***s*** and ending at ***f*** to destination ***d***. |
| ***R**b* | Read file inserted by an ***I*** command into program area, with optional bias *b*. |
| ***Ss*** | Examine or alter memory starting at address ***s***. For each value, type another value to replace it, or RETURN to keep it, or a period to stop the ***S*** command. |
| ***T**n* | Trace execution and display all registers and flags for one or *n* execution steps. |
| ***U*** | Untrace (same as the ***T*** command, without display of registers). |
| ***Xr*** | Examine all CPU registers or examine or alter register *r*, where *r* is one of the following CPU registers: ***C*** (carry flag), ***Z*** (zero flag), ***M*** (minus flag), ***E*** (even parity flag), ***I*** (interdigit carry), ***A*** (accumulator), ***B*** (BC register pair), ***D*** (DE register pair), ***H*** |

(HL register pair), ***S*** (stack pointer), or ***P*** (program counter).

### DDT-86 Debugger (CP/M-86)

***DDT86*** *d:****filename****.CMD*

Load ***filename.CMD*** into the program area to debug with DDT commands (".CMD" assumed if you specify no extension). If you do not specify a ***filename***, you cannot use the ***G***, ***T***, or ***U*** commands until you load a program to debug (usually with the ***E*** command). DDT-86 cannot load a program in hexadecimal format (".H86" files) — convert them first with the GENCMD utility.

### DDT-86 Commands

| | |
|---|---|
| ***As*** | Enter assembly language statements at starting address ***s***. |
| ***Bs,f,s1*** | Compare blocks of memory (starting address ***s***, finishing address ***f***, second starting address ***s1***). |
| ***D****s,f* | Display memory (in hexadecimal and ASCII) at current address or address *s* and continue for 16 lines or to address *f*. |
| ***Efilename*** | Load ***filename*** for execution. |
| ***Fs,f,bc*** | Fill memory with hexadecimal byte ***bc*** from address ***s*** to address ***f***. |
| ***Fs,f,wc*** | Fill memory with hexadecimal word ***wc*** from address ***s*** to address ***f***. |
| ***Gs****,b,c* | Start execution at address ***s***, with optional breakpoints at addresses *b* and *c*. |
| ***G****,b,c* | Start execution at the current address, with optional breakpoints at addresses *b* and *c*. |
| ***Hwc1,wc2*** | Hexadecimal sum and difference. |
| ***Icommand tail*** | Set up input command line with ***command tail***. |
| ***L****s,f* | List "disassembled" code from current address or address *s*, and continue for 12 lines or to address *f*. |
| ***Ms,f,d*** | Move block starting at ***s*** and ending at ***f*** to destination ***d***. |
| ***Rfilename*** | Read disk file into program area. |
| ***Ss*** | Set memory values (bytes) starting at address ***s***. |
| ***SWs*** | Set memory values (words) starting at address ***s***. |
| ***T****n* | Trace program execution for one or *n* execution steps. |
| ***TS****n* | Trace program execution and display all registers and flags for one or *n* execution steps. |
| ***U****n* | Untrace (same as the ***T*** command, except that the CPU state is displayed only before the first instruction is executed, rather than before every execution step). |
| ***US****n* | Untrace (same as the ***TS*** command, except that the CPU state is displayed only before the first instruction is executed, rather than before every execution step). |
| ***V*** | Display information about the last file loaded with the ***E*** or ***R*** commands. |
| ***Wfilename****,s,f* | Write contiguous block to disk file ***filename*** Optional *s* is the 20-bit starting address of block, *f* is the finishing address (block must start on a paragraph boundary, since low four bits of *s* are ignored). Without the optional *,s,f*, it assumes the starting and finishing addresses of the last file read with the ***R*** command (useful for writing out files after installing patches without changing file length). |
| ***Xr*** | Examine all CPU registers and flags or examine or alter *r*, where *r* is a register name or one of the following flags: ***C*** (carry flag), ***O*** (overflow flag), ***Z*** (zero flag), ***I*** (interrupt enable), ***A*** (auxiliary carry), ***T*** (trap), ***D*** (direction), ***S*** (sign) or ***P*** (parity). |

### DUMP in Hex

***DUMP*** *d:****filename***

Display the file's contents in hexadecimal.

### ED Text Editing Program

***ED*** *d:****filename*** *d:*
***ED*** *d:****filename*** *d:filename*

Create and/or edit a text file (***filename***), and optionally specify another disk for the output file, or another file.

### ED Commands

In all ED commands, you can substitute ***#*** for any *n* below to give *n* the highest value (65535). If you do not specify either + or -, ED assumes you mean + unless otherwise noted. "CP" in all explanations stands for the character pointer in the edit buffer. A "string" is a set of ASCII characters.

| | |
|---|---|
| ±***n*** | Perform a ±***nLT command (see L*** and ***T*** commands). |
| ***n:*** | Move CP to beginning of line number ***n***. |
| *n1::n2* | Substitute for any ***n*** or optional *n* below a range of lines beginning with *n1* and ending with *n2*. If either *n1* or *n2* is missing, ED assumes the current line for it. |
| *n****A*** | Append *n* lines or one line from ***filename*** into the edit buffer. A ***#*** for *n* will append 65535 lines (fill the buffer), and a zero for *n* will fill half of the buffer. |
| ±***B*** | Move CP to beginning (+) or end (-) of the edit buffer. |
| ***B#T*** | Move CP to beginning of buffer and display entire buffer. |
| ±***nC*** | Move CP forward (+) or backward (-) ***n*** characters. |
| ±*n****D*** | Delete one or *n* characters in front of (+) or behind (-) the CP. |
| ***E*** | End ED session and close files (normal end of ses- |

sion). A backup (".BAK") file preserves the unedited version.

***nFstring***↑*Z*

Find ***string*** once or *n* times; use optional CONTROL-Z (↑*Z*) at end of ***string*** to type another ED command on same line.

***H***

Save and re-edit file (perform an ***E*** command, then run ED.COM again to edit the file).

***I****string*

Insert lines of text, or just *string*, moving CP to end of inserted lines or characters. If inserting lines, end the insert session with CONTROL-Z (↑***Z***). ***I*** inserts upper case characters only (see ***U*** command).

***i****string*

CP/M versions 2.2 and newer: insert upper and lower case characters, as typed. (Otherwise, same as the ***I*** command).

*n****Jstring1***↑***Zstring2***↑***Zstring3***↑*Z*

Find ***string1***, append ***string2*** to ***string1***, and delete all characters up to but not including ***string3*** (juxtapose all three strings). Use optional ↑*Z* at end of ***string3*** to type another ED command on same line.

***±nK*** Delete the following (+) or previous (-) ***n*** lines.

***±nL*** Move CP to beginning of current line if ***n*** is zero, or move CP down (+) or up (-) ***n*** lines.

***nMstring***↑*Z*

Repeat execution of the ***string*** of ED commands ***n*** times. If ***n*** is zero or one, repeat indefinitely (until an error occurs). Use ↑*Z* to type another ED command on same line.

***nNstring***↑*Z*

Search for the ***n***th occurence of ***string*** throughout the file. Use ↑*Z* to type another ED command on same line.

***O*** Omit the ED session, and keep the original unedited file.

***±nP*** Display ***n*** pages (24 lines per page) of the buffer previous to (-) or following (+) the CP. A zero for ***n*** displays the current line and the following 23 lines.

***Q*** Quit the ED session with no file alterations. Temporary and source files remain as they are, but a previous ".BAK" file of the source file is deleted (be careful — check first to see if you need the previous ".BAK" file).

***R****filename*

Read *filename*.LIB or the file X$$$$$$$.LIB and insert the text into the buffer, moving CP to end of inserted text.

***nSoldstring***↑***Znewstring***↑*Z*

Find ***oldstring*** in the buffer and substitute ***newstring*** for it; repeat the operation ***n*** times if ***n*** is greater than one.

***±nT*** Display the following (+) or previous (-) *n* lines, or the current line if *n* is zero. If *n* is not specifed, ***T*** displays the current line after (+) or before (-) the CP. The command sequence ***B#T*** displays the entire buffer.

***±U*** Translate all characters typed to UPPER case (+), or turn off translation (-).

***±V*** Turn on (+) or off (-) line number display for lines in the buffer.

***0V*** Display number of free bytes left in the buffer, and the total buffer size, in decimal values.

*n****W*** Write to the temporary output file (".$$$" file type) the following *n* lines or only the current line.

***nX*** Copies the following ***n*** lines to the file X$$$$$$$.LIB (retrieve them with the ***R*** command). If ***n*** is zero, this command will *delete* the file X$$$$$$$.LIB.

***nXfilename***

CP/M-86 only. Copies the following ***n*** lines to ***filename*** or appends if previous ***X*** command applied to the same file. If ***n*** is zero, this command will *delete* ***filename***.

***nZ*** Suspend the ED session for approximately ***n*** seconds.

### GENCMD: Convert ".H86" Files to ".CMD" Files (CP/M-86 only)

***GENCMD*** *d:filename option-list*

The *option-list* can contain one or more of the following paramters which define segment groups with specific memory requirements:

*8080* (8080 memory model)
*CODE [An,Bn,Mn,Xn]*
*DATA [An,Bn,Mn,Xn]*
*STACK [An,Bn,Mn,Xn]*
*EXTRA [An,Bn,Mn,Xn]*

Convert hexadecimal ".H86" file into an executable ".CMD" file. In optional parameters controlling the type of memory model, specify addresses (*n*) that are paragraph boundaries. *An* loads the group at absolute location *n*. *Bn* specifies beginning of group at address *n* in hexadecimal file. *Mn* specifies requirement of minimum of (*n* x 16) bytes. *Xn* specifies that the group can address up to (*n* x 16) bytes.

### LOAD: Convert ".HEX" Files to ".COM" Files (CP/M-80 only)

***LOAD*** *d:****filename***

Convert ***filename***.HEX to an executable program called ***filename***.COM.

### MOVCPM: Reconfigure For Memory Size (CP/M-80 only)

***MOVCPM*** $\begin{Bmatrix} * \\ n \end{Bmatrix}$ *

Prepare a new copy of system to utilize *n*K bytes of memory or all available memory (substitute * for *n*). An asterisk (*) after *n* (or after the first asterisk) prepares the copy for a SYSGEN. In versions 1.3 and 1.4, *n* can be from 16 to 64; in versions 2.0 and newer, 20 to 64.

### PIP: Copy Files To Disks and Devices

***PIP destination=source***↵

Run the PIP program with one transfer expression.

***PIP* ↩**

****destination*=*source* ↩**
****destination*=*source* ↩**
*** ↩**

Run PIP to perform several operations. End PIP session by pressing RETURN. Transfer expressions can take any of the following specific forms (***d:*** is a required disk drive prefix with colon, *d:* is an optional drive prefix with colon, and *[p]* represents optional parameters shown at the end of this section).

*d:****newcopy***=*d:****original****[p]*
*d:****newcopy***=*d****original****[p]*,*d****original****[p] ...*

Copy one file to another using new name for the copy, or concatenate the contents of several files into a new file with the name ***newcopy***.

***d:***=*d:****original****[p], ...*
***d:***=*d:****filematch****[p], ...*

Copy one or more files to another disk, using the same filenames. You can use a ***filematch*** such as ***SAMPLE??.TXT*** or ****.****. The first ***d:*** is required, since another disk must be specified.

***dev:***=*d:****filename****[p], ...*

Send the contents of one or more source files to an output device.

*d:****filename***=***dev:****[p], ...*

Transfer the input from an input device to a destination file.

**PIP Device Names: CP/M-80**

| | |
|---|---|
| ***CON:*** | Console display and keyboard (input and output) |
| ***RDR:*** | Reader device (input only) |
| ***PUN:*** | Punch device (output only) |
| ***LST:*** | List device, usually a printer (output only) |

Special PIP "devices" are not devices: they perform special functions associated with devices. They are:

| | |
|---|---|
| ***NUL:*** | Send 40 "nulls" (ASCII value of 0) to file or device. |
| ***EOF:*** | Send an "end of file" mark (ASCII 1AH, or ↑***Z) to file or device.*** |
| ***OUT:*** | A custom device for data output. PIP must be modified for it. |
| ***INP:*** | A custom device for data input. PIP must be modified for it. |
| ***PRN:*** | A special form of LST: which handles tabs and page breaks and numbers lines. |

**PIP Device Names: CP/M-86**

| | |
|---|---|
| ***CON:*** | Console display and keyboard (input and output) |
| ***AXI:*** | Auxiliary input device (input only) |
| ***AXO:*** | Auxiliary output device (output only) |
| ***LST:*** | List device, usually a printer (output only) |

Special PIP "devices" are not devices: they perform special functions associated with devices. They are:

| | |
|---|---|
| ***NUL:*** | Send 40 "nulls" (ASCII value of 0) to file or device. |
| ***EOF:*** | Send an "end of file" mark (ASCII 1AH, or ↑***Z) to file or device.*** |
| ***PRN:*** | A special form of LST: which handles tabs and page breaks and numbers lines. |

**PIP Parameters**

In all forms of PIP expressions, optional (*[p]*) parameters can be specified to perform special functions. Letters for *p* are:

| | |
|---|---|
| ***B*** | Block mode transfer, used to read data from paper tape (CP/M-80 only). |
| ***Dn*** | Delete any characters after the ***n***th column; used to send wide lines to a device that only handles narrow lines. |
| ***E*** | Display ("echo") copy operation as it is performed. |
| ***F*** | Filter out form feeds (ASCII value 0CH, or "FF" or ↑***L).*** |
| ***Gn*** | Get file(s) from user area ***n*** (CP/M version 2.0 or newer). |
| ***H*** | Check for proper Intel hexadecimal format records. |
| ***I*** | Ignore any null records in transfers of Intel hexadecimal records. |
| ***L*** | Convert UPPER case letters to lower case letters. |
| ***N*** | Add line numbers to each line copied; lines end with the ASCII "CR" and "LF" characters produced by typing RETURN. |
| ***O*** | Ignore ↑***Z*** end of file marker for copying non-text files. The O parameter is not necessary for copying ".COM" files. |
| ***Pn*** | Add a form feed (ASCII value 0CH, or "FF") after the ***n***th line. |
| ***Qstring*↑*Z*** | Copy portion of a file, stopping on ***string***. If used on PIP command line rather than following PIP's * prompt, the Q parameter looks for all UPPER case version of ***string***; otherwise, it looks for actual ***string***. |
| ***R*** | Copy "system" files (with **SYS** attribute). |
| ***Sstring*↑*Z*** | Copy portion of a file, starting on ***string***. |
| ***Tn*** | Set tab stops at every ***n***th column, so that ↑***I*** (TAB key) characters are replaced with spaces to position the next character at column divisible by ***n***. |
| ***V*** | Verify copy by comparing it with the source file. |
| ***W*** | Copy into a read-only file overriding read-only attribute. |
| ***Z*** | Set the unused 8th bit (parity bit) of each character to 0. |

**STAT: System Statistics**

***STAT*** *d:*

By itself, ***STAT*** tells you the space used and the available space on disk. With a disk drive prefix *d:*, STAT tells you the space available on the disk in that drive.

***STAT*** { *d:**filename** atr* / *d:**filematch** atr* }

Display size and attributes of ***filename*** or files that match ***filematch***. You can change the attributes of one or more files by specifying one of the optional *atr* attributes below. A file can have two non-opposing attributes.

**CP/M-80 Attributes:**

| | |
|---|---|
| ***$R/O*** | Read-only: file can not be written to or erased. |
| ***$R/W*** | Read-write: opposite of ***$R/O*** (default). |
| ***$SYS*** | System file: does not appear in DIR displays (you must use the ***[R]*** parameter with PIP to copy them). |
| ***$DIR*** | Directory file: opposite of ***$SYS*** (default). |

**CP/M-86 Attributes:**

| | |
|---|---|
| ***RO*** | Read-only: file can not be written to or erased. |
| ***RW*** | Read-write: opposite of ***RO*** (default). |
| ***SYS*** | System file: does not appear in DIR displays (you must use DIRS to display them, and the ***[R]*** parameter with PIP to copy them). |
| ***DIR*** | Directory file: opposite of ***SYS*** (default). |

***STAT USR:***

Display user numbers.

***STAT*** *d:**DSK:***

Display disk information for current drive or drive *d:*.

***STAT d:=R/O***

Assign read-only attribute to disk ***d:*** (CP/M-80).

***STAT d:=RO***

Assign read-only attribute to disk ***d:*** (CP/M-86).

***STAT DEV:***

Display physical device assignments.

***STAT VAL:***

Display possible device assignments and STAT summary.

***STAT log:=phy:***

Assign physical device to logical device name.

**Logical Device Names: CP/M-80**

| | |
|---|---|
| ***CON:*** | Console display and keyboard for both input and output |
| ***RDR:*** | Reader device for input only |
| ***PUN:*** | Punch device for output only |
| ***LST:*** | List device (printer) for output only |

**Logical Device Names: CP/M-86**

| | |
|---|---|
| ***CON:*** | Console display and keyboard for both input and output |
| ***AXI:*** | Auxiliary input device (input only) |
| ***AXO:*** | Auxiliary output device (output only) |
| ***LST:*** | List device (printer) for output only |

**Physical Device Names**

| | |
|---|---|
| ***TTY:*** | Slow CON: device (teletypewriter) |
| ***CRT:*** | Fast CON: device (cathode ray tube display) |
| ***LPT:*** | Line printer |
| ***BAT:*** | Batch processor |
| ***PTR:*** | Paper tape reader (RDR: device) |
| ***PTP:*** | Paper tape punch (PUN: device) |
| ***UC1:*** | User-defined (custom) CON: device |
| ***UL1:*** | User-defined (custom) LST: device |
| ***UR1:*** | User-defined (custom) RDR: device |
| ***UR2:*** | User-defined (custom) RDR: device |
| ***UP1:*** | User-defined (custom) PUN: device |
| ***UP2:*** | User-defined (custom) PUN: device |

**SUBMIT Utility and XSUB**

***SUBMIT*** *d:**filename** parameters*

Create $$$.SUB to contain your commands in your ***filename***.SUB, then execute the commands. Any *parameters* you include replace your arguments (**$1**, **$2**, etc.) in your submit file. Include ***XSUB*** as your first command in your ".SUB" file so that your commands/programs can query your console.

**SYSGEN: Copy System (CP/M-80)**

***SYSGEN***

Place a copy of the system on disk. SYSGEN asks for the source drive of your system disk, and then the destination drives for your copies. Type RETURN to restart your system. CP/M-86 users: use COPYDISK.

## *Common Error Messages*

**NO FILE or FILE NOT FOUND**

Disk does not contain file you specified.

**BDOS ERR ON d:**

No disk in drive, disk is not formatted, disk is so old that CP/M can't read it, disk drive is not on, door not closed, or drive doesn't exist, or you're trying to write to a read-only disk.

**INVALID DISK ASSIGNMENT**

In a STAT command, you followed ***d:*** with something other than =***R/O*** (or =***RO*** in CP/M-86).

**whatever you typed?**

If whatever you typed was repeated and followed by a question mark (**?**), it is probably a misspelled command, or the filename you typed does not exist as a ".COM" file on the current disk.

# Using CompuServe

## *An information service from H & R Block*

by Cheryl Rhodes & Tony Bove

*In this article we use* **THIS TYPEFACE** for words you type, and **This Typeface** for messages and menus displayed on your screen while using CompuServe or other systems. The ⮐ symbol is used to show when to press the RETURN (or ENTER) key, and the ↑ symbol shows when to use the CONTROL (CTRL, CNTL or ALT) key in combination with another letter (as in **↑C** for CONTROL-**C**).

For some desktop computer users, data communications is the major reason for buying the computer. A computer can be much "smarter" than a "smart" terminal in communicating with large "host computers" and information services like The Source and CompuServe.

### *Computer Communications*

Computers can be connected together, physically by cable or other means, to transfer data from one to the other (and back). You can also connect a computer to a telephone, and make a call to another computer also connected to a telephone, and exchange data as if the computers were having a conversation.

Computer-to-computer conversations follow certain rules known as *data communications protocols*. Unfortunately there is no single standard for all computers; however, there are recognized standards adhered to by most computers and information services. CompuServe will listen and respond to your requests if your computer can transmit ASCII characters (most desktop computers use ASCII characters).

What do you need for your computer to communicate? At minimum, you need a modem and a connecting cable known as an RS- 232-C cable or *serial data port* cable (usually in the same package with the modem device). Ask your dealer to verify that the connections on each end of the RS-232-C cable match those expected by your modem and computer (if the computer is at home, bring its documentation with you when you decide to buy a modem).

You must also equip your computer with a program to handle data communications. There are many fine programs available, but be aware that prices aren't always tied to the number of features. MODEM7, for instance, is available for the cost of the floppy disk you receive it on, and many CP/M user groups can help you "configure" it for your system. To get cost effective results from an information service like CompuServe, your modem software should have a "downloading to disk" storage feature.

To use the CompuServe service, you need a CompuServe account number and password. You can sign up at your local computer store, or contact CompuServe (an H & R Block Company) directly at: CompuServe Information Service Division, 5000 Arlington Centre Blvd., Columbus, OH 43220 (614) 457-8650.

### Modems

The term "modem" is short for "modulator/demodulator" which describes a device that changes computer signals into phone transmission signals and back again into computer signals. There are two kinds of modems: *direct-connect* modems that plug directly into your telephone line jack and require registration with the phone company, and *acoustic coupler* modems that have fittings for the handset of your standard telephone, and need no phone company registration.

What kind should you use? Direct-connect modems offer a better connection, with less errors in the transmitted data. Some direct-connect modems also offer automatic phone dialing, automatic phone answering, and other useful features. However, direct-connect modems are more expensive, and they supposedly require phone company approval (which is not hard to get). Although most homes and offices now use the modular jacks for "plug-in" extension phones, some direct-connect modems require special connectors, and some telephones (including pay phones) do not provide access to the line directly.

Acoustic coupler modems are less expensive and do not require a special phone jack or phone company approval. Acoustic couplers transmit through your phone's handset, and can be used with pay telephones and others without direct access to the line. However, princess telephones and some home models may not fit properly in the coupler.

Although acoustic coupler modems do not provide the features of direct-connect modems, they are adequate for communicating with the CompuServe service.

Your modem should have its own instructions and settings. CompuServe expects you to communicate in "full duplex" mode (a switch on your modem sets this mode) and at 300 baud (approximately 30 characters per second, a Bell Telephone standard speed for acoustic couplers and most other modems). 1200 baud service is also available (approximately four times faster than 300 baud), but you must pay over three times more per hour.

Acoustic coupler modems are connected to the telephone only when used to communicate (using the telephone handset), but direct-connect modems are usually connected to the phone line for indefinite periods. Some users dedicate one phone line for long- term modem connection and use.

### Communications Software

You also need a program that transmits data through the serial data port (modem port) of your computer. There are a variety of such programs available for CP/M systems. We use the public-domain (free) MODEM7 program, which is available through users' groups and from CP/M bulletin board systems, as well as some stores that sell modems (for a nominal charge). We have also used other excellent commercial programs that provide more features (AMCALL and COMMX on a variety of CP/M systems, and Micro-Link on the Osborne 01). We intend to compare these and other modem programs in a future issue of *The User's Guide.*

One problem for newcomers: the modem program you get should be already configured for your computer, and be supplied on your computer's disk format. MODEM7 must be tailored for most systems, so you may want to purchase a customized version, or a commercial package (all will work with CompuServe). If your software cannot "download to disk," you can still use the CompuServe service, but you cannot save the results, unless you set up your computer to print everything that happens on your screen (using the CP/M CONTROL-P command).

## *CompuServe's Services*

CompuServe provides informative services like Standard & Poor's data base and the MicroQuote program to keep abreast of daily stock prices and financial transactions. CompuServe also offers the MicroNet personal computing service, instant "electronic mail" message delivery to any other user, an "electronic bulletin board" for messages to all users, and a "CB Simulator" that lets you "talk" (by typing messages) to any number of people over thirty-six different channels.

CompuServe's latest electronic offerings include banking, shopping at home, several daily newspapers, AP world news, world weather, and special flight planning services for pilots of private planes.

Some CompuServe services are quite expensive, and others are surprisingly inexpensive and very useful. As you learn more about CompuServe, you will also learn to be more thrifty with the service. CompuServe offers a free first hour to all users. Use it wisely to learn about the system and how to avoid the high costs of some services.

## *Starting a CompuServe Session*

A *CompuServe account* consists of a unique ID number and secret password. CompuServe uses the number to keep track of your use of the information service and to charge you for certain services. You use the secret password to "log on" (turn on the services) with your unique ID number.

Keep your password secret, so that someone else cannot use your number without your help (otherwise, you'd have to pay the charges). You can change it as often as you like by typing ***GO CIS-175*** and following the instructions. Don't use your name or initials as your password, since someone could easily guess them.

Most CompuServe accounts give you permission to use the service between the local hours of 6PM to 5AM weekdays and all day Saturday, Sunday, and holidays. Business accounts may use CompuServe during regular business hours, but the service is far more expensive during these peak hours.

You can look up the CompuServe number for your local area using the list of phone numbers provided. The phone numbers marked "C" in the list are direct lines to the CompuServe computers. CompuServe adds more of these direct lines as the number of subscribers grows.

Others (marked "T" on the list) are lines through a supplemental network known as Tymnet. To access CompuServe through Tymnet, you pay an extra $2 an hour (in addition to CompuServe's $5 per hour). However, some areas have only Tymnet numbers. Using a local Tymnet number may be less expensive than using a long-distance CompuServe number. All numbers are available for use by all users. You should choose a 300 baud number if you are using a 300 baud modem, or a 1200 baud number if you are using a 1200 baud modem.

### Calling CompuServe Through Tymnet

Turn on your modem and computer, start your modem program, and dial your local Tymnet number. Listen (while it rings and after Tymnet answers) until you hear a high-pitch whine signaling data transmission. If you are using an acoustic coupler, place your telephone handset firmly in the coupler; if you're using a direct-line modem, set it for data transmission (some have a "data" switch to set).

If Tymnet doesn't immediately recognize your terminal or computer signal, the following message should appear on your screen:

```
PLEASE TYPE YOUR TERMINAL IDENTIFIER
```

If the message is garbled, check your modem's setting and set it to "Full Duplex" and "300 baud." If you still do not have a coherent message as shown above, hang up and try calling Tymnet again. Make sure you are dialing a 300 baud phone number if you are using a 300 baud modem.

CompuServe customers who live outside Ohio can call (800) 848-8990 from 8:30 AM to midnight (Eastern Daylight or Standard Time) for assistance. From within Ohio or outside the continental U.S., call (614) 457-8650 for help. If a human doesn't answer, you will be able to leave a taped message (do not reveal your password if you decide to leave a taped message).

With the above message on your screen, type the letter "A" (this is the most popular terminal identifier). Tymnet responds with another message:

```
PLEASE LOG IN
```

Respond by typing the CompuServe "log-in" word:

```
CIS↩
```

At this point Tymnet performs the CompuServe "log in" key sequence, the CONTROL-C sequence, so you don't have to type it yourself. You should see a **↑C** displayed on your screen, followed by the CompuServe **User ID:** message shown below. If you don't see the **User ID:** message, type a CONTROL-C command (hold down your CONTROL key and type ***C***).

**Calling CompuServe Directly**

Turn on your modem and computer, start your modem program, and dial your local (or long-distance) CompuServe number. Listen (while it rings and after CompuServe answers) until you hear a high-pitch whine signaling data transmission. If you are using an acoustic coupler, place your telephone handset firmly in the coupler; if you are using a direct-line modem, set its switches for data transmission.

With the modem set for data transmission (or telephone handset firmly set in the coupler), hold down your CONTROL key and type ***C***. The CONTROL-C command should appear on your screen as **↑C**, and after a second or two, the following message should appear on your screen:

```
User ID:
```

If the message is garbled, check your modem's setting and set it to "Full Duplex" and "300 baud." Try the CONTROL-C key sequence again. If the message is still garbled (or if there is no message), try calling CompuServe (make sure you are dialing a 300 baud phone number, if you are using a 300 baud modem) again.

**Logging On to CompuServe**

With the above message on your screen, type your user number, usually a five-digit number, followed by a comma, another three-digit number, and the RETURN key:

```
User ID: 00000,000↩
```

CompuServe should respond with the following message:

```
Password:
```

Type your secret password and press your RETURN key. *You will not see your password as you type it!* It is invisible for your protection (to keep others from seeing it as you type it).

If you misspell your password, CompuServe will print the following message and give you a second try:

```
?? LOGINE - Invalid entry - try again
```

If you typed your password correctly, you will be welcomed into the CompuServe network.

## *Using The System*

On your first call to CompuServe, you will be asked to sign up for continued services. Do so immediately, since you have only one free hour before you lose the account otherwise. When a menu with numbered choices is displayed, CompuServe tells you to "key" a number, which means type the number you want and press the RETURN key.

CompuServe tells you to press your ENTER key, which is a reference for Radio Shack computers and terminals whose ENTER keys function as Carriage Return/Line Feed (known as RETURN). In other words, CompuServe's ENTER key is the same as the typical RETURN key on computers that run CP/M.

CompuServe asks for personal billing information, including your complete name and address, your Mastercharge or VISA card number (to bill you directly for CompuServe charges), and the expiration date of your card. Answer each question by typing an answer and pressing your RETURN key.

If you charge the service to your VISA or Mastercharge card, CompuServe charges are detailed on your usual VISA or Mastercharge monthly statements, and you do not get a separate statement from CompuServe.

If you don't want to pay by VISA or Mastercharge, CompuServe will bill you directly or you can establish credit with VIP, but you pay extra for the statements CompuServe sends you regularly. To find out more about the VIP account, write to: CompuServe VIP Account, Attn: Kathy Gallagher, Box 629, Dept. 0585, Columbus OH 43271.

If you want to use CompuServe during business (daytime) hours, you should first establish service as a personal (evening) user. There is a minimum monthly charge of 2 hours per month (2 HOURS = $45 for 300 baud, $70 for 1200 baud) on daytime accounts. There is no monthly minimum for evening service.

At the end of your sign-up session, CompuServe displays a page of "what's new" in the service, and in a moment you'll be given a chance to go directly to these topics. Skip to the next CompuServe page by pressing your RETURN key. The **TOP menu page** of selections should appear:

```
CompuServe                    Page CIS-1

CompuServe Information Service

1 Home Services
2 Business & Financial
3 Personal Computing
4 Services For Professionals
5 User Information
6 Index
Enter your selection number,
or H for more information.

!
```

CompuServe's menus consist of a *page* showing selections and an exclamation point (**!**), called a *prompt*, telling you that CompuServe is now "listening" and awaiting your typed response.

You can select an item by typing its number and pressing the RETURN key, or you can simply press RETURN to see the next page of information. You can also type ***H*** for help, followed by the RETURN key, to get the following summary of CompuServe commands:

```
!H↵

Brief Command Summary
******************************

T  -  TOP menu page
M  -  previous MENU
F  -  FORWARD a page
B  -  BACK a page
H  -  HELP
R  -  RESEND a page
S  n  -  SCROLL from item "n"
G  n  -  GO directly to page "n"
N  -  display NEXT menu item
P  -  display PREVIOUS menu item
KEY S OR ⟨ENTER⟩ TO CONTINUE

!
```

You can see the next page of information by pressing the RETURN key, and you can read page by page by pressing RETURN each time you reach the end of a page. You can also "scroll" more quickly through pages by typing ***S*** at the end of a page. You may reach the end of a set of pages and see the following message:

```
Last page. Key M for menu
```

At this point, you can type an ***M*** followed by RETURN to go back to the **TOP menu page** shown previously, or you can type the following command (a good idea if this is your first time on the system today) to see what's new on the system:

```
!GO NEW↵
```

The GO command (or type ***G***) lets you move directly to almost any page in the CompuServe data bases. You can use the GO command from any menu page to go quickly to any other page if you know either the data base name or the page number.

Names of data bases are available if you type ***H*** (or ***HELP***), followed by the RETURN key, and scroll through all the messages. Each page in each data base has a page name and number in its upper right corner. We show CompuServe menus with the page numbers they occupied in September, 1982 (how often they change pages and menus is an ongoing mystery; they are trying to incorporate data base supplier and subscriber feedback for an easy to use and constantly expanding service).

You can select items from menus to get to any page in the CompuServe data bases and never use the GO command; however, users who want to save time (and money) can use the GO command to move to specific pages.

With the GO command you type a page number or just the name of the data base (the name of the "what's new" data base is NEW). The preceding ***GO NEW*** command displays the **WHAT'S NEW** menu shown below.

```
CompuServe                    Page NEW-1

 * * * * * WHAT'S  NEW * * * * *
Current  Week's Announcements

********************************
1  SOFTWARE SIG CONFERENCE 9-8-82
2  SPECIAL CONFERENCE FOR 9-4-82
3  COMP-U-STORE - BACK TO SCHOOL
4  NEW NUMBERS IN NC, CA, CO
5  LABOR DAY HOURS STILL THE SAME
6  UAB OFFERS ACCESS TO EVERYONE

Input a number or key
⟨ENTER⟩ for more choices

!
```

You can select an item by typing its number, followed by RETURN. This will give you the item's pages one at a time (you have to press RETURN for the next page).

You can also select an item and scroll through the pages by typing ***S***, a space, the number of the item, and the RETURN key. The ***S*** command saves time by scrolling pages without asking for a response from you. Once you've located the menu you're looking for, use the ***S n*** command to select an item and scroll through its pages.

To return to the **WHAT'S NEW** menu, type an ***M*** followed by the RETURN key. Another ***M*** command from the **WHAT'S NEW** menu page will put you in the previous menu (the **TOP menu**).

The **TOP menu** shows the major selections in the Videotex service, as well as the MicroNet Personal Computing selection for the computing service. You can pick any Videotex selection and explore the possibilities of, say, home services or financial services and still return to the **TOP menu** by using the ***T*** command followed by RETURN.

### *Financial Services*

If you are using CompuServe for financial business, you won't want to waste any time: select number 2 from the **TOP menu** to get this menu of selections:

```
CompuServe    Page FIN-1

BUSINESS AND FINANCIAL SERVICES

1  News/Reports
2  Reference Databases
```

```
3 Communications

Last menu page. Key digit
or M for previous menu.

!
```

For financial news and reports, select number 1:

```
!1↵

CompuServe    Page FIN-10

********** NEWS/REPORTS ***********

1 Business Information Wire
2 The Business Wire
3 MMS Financial Analysis
4 Commodity News Service
5 Archer Commodity Report
6 Stevens Business Reports
7 Investor Protection Report
8 Investment News and Views
9 Raylux Investors' Reports

Last menu page. Key digit
or M for previous menu.

!
```

The newest menu item in this list is the Business Information Wire service from Canadian Press (a cooperative of 111 daily Canadian newspapers, founded in 1911), which carries news stories under 18 categories (like agriculture, banking, economy, environment, forestry, manufacturing, mining, transportation, etc.). International news is provided by the Associated Press, Reuters and Agence France-Presse. An historical data base called Newstex dates back to January 1974, and contains about a million stories.

Like most other CompuServe business and financial data bases, the BIW service costs extra ($5) per hour of connect time during standard (evening) hours. Daytime subscribers pay an extra connection fee of $22.50 per hour, plus a monthly subscription fee of $50.

When you are using the expensive data bases, to get the most for your money you should use modem software that has downloading capabilities to capture the data on your screen and store in on your disk, or print it. With the data on your disk, or a printed copy available, you can reduce reduce the time you spend connected to the CIS computers.

By typing an ***M*** (followed by RETURN) from within a report or financial news feature, you return to the menu above that pointed you to the report or news feature. By typing an ***M*** (followed by RETURN) *again*, you return to the previous menu — **BUSINESS AND FINANCIAL SERVICES** — the one that pointed you to the menu of financial news features and reports.

From the **BUSINESS AND FINANCIAL SERVICES** menu, you can select the **REFERENCE DATABASES** (number 2):

```
!2↵

CompuServe                 Page FIN-20

******** REFERENCE DATABASES ******

$ 1 MicroQuote
$ 2 Quick Quote
$ 3 Standard and Poor's
$ 4 Value Line Data Base II
  5 Descriptions and Premium
    Program Rates

$ Indicates Premium Program
Last menu page. Key digit
or M for previous menu.

!
```

MicroQuote, for an extra charge to your CompuServe account, will give you current and historical data on 40,000+ stocks, bonds and options including NYSE prices, AMEX prices and OTC stock prices. Select item 1 from the above menu for MicroQuote, but first you should order the MicroQuote User's Guide ($4.95, Order Code: CS-447) from FEEDBACK (type ***G CIS- 4***).

Standard & Poor's "premium" data base (item 3) contains financial statistics and other information about 3000+ publicly held corporations. For more information, write to: Standard and Poor's Corporation, 25 Broadway, New York NY 10004.

### *Home Services*

CompuServe's home services include electronic mail and the CB Simulator (with the **Communications** selection), games (with the **Entertainment** selection), newspapers, home management programs, special services like national weather for the public, or marine and aviation weather data, or ski-slope weather forecasts, etc. To get the **HOME SERVICES** menu, select number 1 from the **TOP menu**:

```
!1↵

CompuServe                 Page HOM-1

HOME SERVICES

1 News/Weather/Sports
2 Reference Library
3 Communications
4 Shop/Bank at Home
5 Groups and Clubs
6 Games and Entertainment
7 Education
8 Home Management
```

The **News/Weather/Sports** menu (page **HOM-10**) gives you access to *The Columbus Dispatch*, *The Washington Post*, the *St. Louis Post-Dispatch*, the NOAA Weather Wire, and the PGA Golf Data Base.

| | Name | Topic |
|---|---|---|
| ACR | Archer Commodities | Financial |
| AJC | Atlanta Journal | Newspaper: Atlanta GA |
| APN | AP Wire Sports News | News |
| ASI | Aviation Safety Institute | FAA reports |
| ATR | Atari Newsletter | Manufacturer's newsletter |
| BHG | Better Homes and Gardens | Nutrition, meal planning |
| CBM | Commodore's Information Network | Manufacturer's newsletter |
| CDP | Columbus Dispatch News | News summary: Columbus OH |
| CIS | CompuServe's Main Menu | CompuServe's Top (see T in CIS command summary) Menu |
| CNS | Commodity News Service | Financial, Intl. weather, news |
| CUS | Comp*U*Star | Shopping at home |
| CVP | CompuServe Viewpoint | Videotex views, Filge (File generator and editor) instructions |
| EMA | Electronic Mail | Electronic messaging |
| FED | Investor Protection Report | Financial |
| FIN | Futures Industry News | Financial services main menu |
| GAN | Gandolf's Fashion Report | Clothing design news |
| GPO | Government Publications Office | Consumer news, tips |
| HOM | Home Information | Home services main menu |
| IND | Index | CIS index, AP world, financial news access |
| INV | Investment News & Views | Financial commentaries |
| LAT | Los Angeles Times | Newspaper: Los Angeles CA |
| MCS | MicroSoft News | Manufacturer's newsletter |
| MDN | Middlesex Daily News | Newspaper: Framingham MA |
| MMS | MMS Financial Analysis | Financial: Securities Info., Fedwatch newsletter |
| MST | Minneapolis Star Tribune | Newspaper: Minneapolis MN |
| NEW | What's New | New services on CIS |
| NYT | New York Times | Newspaper: New York NY |
| PCS | Personal Computing System | Personal computing services main menu |
| PEM | Popular Electronics | Personal electronics computer club news |
| PSC | Popular Science | Magazine |
| PSE | Popular Science, Energy | Magazine |
| PSP | Popular Science, Photography | new product news, software reviews, satellite TV news |
| RBO | Business Outlook | Financial |
| RCA | RCA News | Manufacturer's Newsletter |
| RFC | Financial Commentaries | Financial |
| SBR | Stevens Business Reports | Financial: small business reports |
| SFC | San Francisco Chronicle | Newspaper: San Francisco CA |
| SFE | San Francisco Examiner | Newspaper: San Francisco CA |
| SPD | St. Louis Post Dispatch | Newspaper: St. Louis MO |
| TCB | The College Board | choosing a college, financial aid, adult ed., SAT test info |
| TFF | The Future File | News features and interviews on computing, bio-engineering, telecommunications, etc. |
| TMA | The Micro Advisor | Micro news, software reviews |
| TMC | The Multiple Choice | Quizzes for enjoyment/learning for adults: also, TMC-27 for kids |
| TRB | The Refundle Bundle | manufacturer's coupon refund and "freebies" newsletter |
| TRS | Tandy/Radio Shacks News | Manufacturer's newsletter |
| TWP | The Washington Post | Newspaper: Washington DC |
| VIF | Video Information | Video newsletter for professionals |
| VPL | Virginian-Pilot & Ledger Star | Newspaper: Virginia |
| WEA | Weather Reports, National | NOAA aviation, marine and land weather (see CNS-17 for Asian, African, European, N. American, and S. American weather) |

The **Communications** selection (page **HOM-30**) gives you several user-to-user communications facilities: Electronic Mail for sending a message to another user, the CB Simulator for "talking" with one or more users (simulating Citizen Band radio channels), and the National Bulletin Board for posting and reading messages.

Lobby Letters of America offers a service to send letters to members of congress and other federal officials and agencies, as well as national corporations, organizations, products and services, national TV stations and shows, newspaper and magazine editors, and foreign leaders and officials.

The **Reference Library** menu (page **HOM-20**) offers *Better Homes & Gardens*, movie reviews, *Popular Science*, The Refundle Bundle, U.S. Govt. Publications, the Pan American Travel Guide and other periodicals and "videotex magazines." Health-Tex, a "magazine" from the Health Resources Corp. of America, offers information and health tips on a variety of medical topics. It even has an "emergency" mode that offers information on poison antidotes, resuscitations and first aid.

The **Shop/Bank at Home** menu (page **HOM-40**) offers the ability to purchase goods at the COMP-U-STORE, order cassette tapes of popular National Public Radio programs (**NPR Cassette Gazette**), purchase computer graphics printouts (**Art Gallery**) and bank electronically.

You can do your banking electronically (Tell-A-Pay bill payment service, or view current checking/savings account statements) with Financial Interstate Services Corp. in Knoxville Tennessee (call (615) 637-2035 for an ID number). The United American Bank of Knoxville (615) 971-2265, and the United American Bank of Memphis Tennessee (901) 766-2717 are participating in this electronic banking service.

A demonstration of home banking begins on page **HOM-6**. Although the home banking service was initially limited to those customers using TRS-80 Color Computers, it has recently been expanded to include most other microcomputers as well.

The **Groups and Clubs** include clubs for HAM radio hobbyists, "CB Simulator" users (CBIG), and other special interest groups such as those interested in sports, photography and music (Photo-80/Orchestra-80), gourmet cooking (hosted by Better Homes and Gardens staff), and even a group with an interest in networking (Netwits).

☞ NOTE: Computer clubs and user groups are *not* listed here. For computer-related information, clubs, newsletters and user groups, try the Personal Computing Service menu.

```
COMPUSERVE                    PAGE HOM-50

GROUPS AND CLUBS

1 CBIG
2 HAMNET
3 NETWITS
4 PHOTO-80
5 SPORTS
6 COOKS' UNDERGROUND
7 BELMONT'S GOLF SIG
8 INSTRUCTIONS
9 DESCRIPTIONS OF GROUPS
```

## *Professional Services*

At this time, CompuServe offers a flight planning service, a newsletter, a wire service and a special interest group (AVSIG), all for amateur and professional aviators. A health care special interest group also appears in the **Services For Professionals** menu, and we assume that more services will become available for other professionals.

```
!4

CompuServe                    Page SFP-1

Services For Professionals

Aviation
 1 ASI Newsletter
 2 NOAA Weather Wire
 3 AVSIG
 4 EMI Flight Plans
Medical
 5 Health Care SIG
```

EMI flight planning is based on aircraft navigation where pilots fly with radio signals from VORTAC stations. Navigators without special RNAV (area navigation) equipment must plan routes that pass over or near these stations (to maintain radio contact), whereas navigators with RNAV equipment can create "synthetic" VORTAC stations and possibly fly shorter distances. The EMI flight planning service is useful for pilots whether or not they have RNAV equipment. Pilots with RNAV equipment use the EMINAV flight planning, and pilots without the special equipment use the EMIVOR planning.

The programs also provide the two most recent weather reports for the origin and destination, and the most recent forecast for those locations, including the winds at selected altitudes and information on severe weather.

## *Data Bases*

To help you find a specific data base without going through a long series of menus, we have compiled a table of data base acronyms (3 letter abbreviations). Type ***G XXX*** (substitute a specific data base acronym for ***XXX***) at any **!** menu prompt to go to the desired data base.

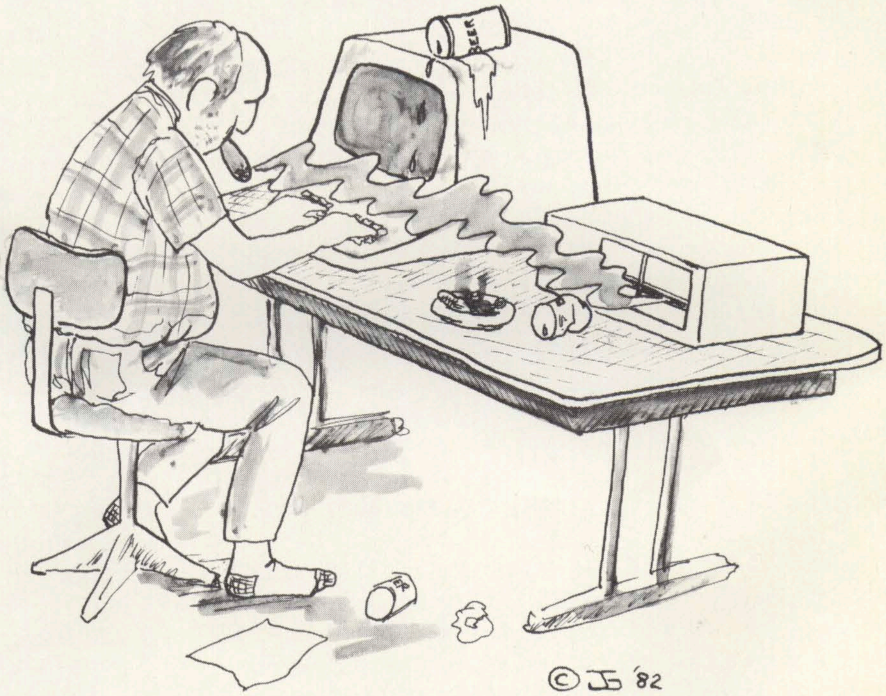
CompuServe adds new data bases often, so there may be more than we have listed here. Since some Compuserve page numbers change frequently, you don't need to give a page number with the ***G(o)*** command. You will go to the top menu of the desired data base if you don't specify a page.

We have unfortunately run out of space. The CompuServe Personal Computing System, useful for running programs on CompuServe's DECsystem-10 and DECsystem-20 minicomputers, will be covered in a future article. It is recommended that you buy the manuals before using the Personal Computing System services. Select **Feedback** from the **User Information** menu to order these manuals and any other documentation.

**A⟩STAT⊃** ... by Kelly Smith

# Preventing Computer Disasters

*System care, feeding and preventive maintenance*



*Watch the* **A⟩STAT⊃** column for tips, opinions, rumors and maybe even some facts from the ever-resourceful Kelly Smith, system operator (SYSOP) of the infamous CP/M-Net system (a remote bulletin board and free software exchange for CP/M® users). Kelly brings you the collective wisdom of thousands of CP/M-Net callers and users. The phone number of his system is 805-527- 9321, and keep trying!!

This article tells how to avoid disasters with your micro system, and how to recover from the brink of data annihilation. I feel qualified to give this advice, having poked, fiddled and thrashed around with systems for about five years. The advice is general enough to apply to almost any make and model microcomputer, and particular enough to provide the essential details that will keep your computer happy and you content.

### *Power Input: a Proper Diet*

Consider carefully the power source for your system. If possible, use a 3-wire (protective ground) outlet that has a 15 Amp (or more) power capacity that is *directly connected* to your home main circuit breaker. It is ideal to have this circuit on its own breaker, isolated from the rest of the utility outlets used for the various appliances in your home or other machines in your office.

Your circuit breakers or fuses may be marked as to which breaker services which room. To find such an outlet, you can use a small lamp as a voltage indicator. Turn off all but one of the circuit breakers to your home, and plug the lamp into the outlet you want to use for your computer. If it does not light, turn the circuit breaker off and try another until you locate the one that services the outlet you want to use.

Make sure the power has a direct and isolated path to your system. After you've isolated the path, plug the lamp into the remaining power outlets, making note of what *else* is on the power line. This is very important, because you need to remove (or at least minimize) the number of "power hogging" and "glitch producing" appliances attached to your system's power line.

Some examples of "power hogging" appliances are electric heaters, electric ovens, stoves, refrigerators and toasters. One or more of these appliances can drop the available input line voltage to as little as 80 VAC or less. Low line voltage (especially with typically non-regulated microcomputer power supplies) will cause a localized "brown-out" effect in your system. This "brown-out" may not be readily apparent to you because other appliances around your home (e.g., radios, televisions, florescent lighting) may be perfectly happy working in this situation.

What about the "glitch-producing" appliances that are lurking quietly, waiting for the precise moment to raise havoc with the computer? They have the potential for not only spurious problems that clobber your work disk (and possible hours of work), but expensive damage to your system!

Remember this rule: if it has a *motor* in it, *avoid* it! Don't have motors on the same circuit as your system. "Glitch-producing" devices include refrigerators, air conditioners, washers and dryers, electric typewriters... in short, any devices with motors or solenoids. These appliances provide a double edged problem: When turned on, they can cause the "brown-out" effect, and in addition, put transient voltages (sometimes on the order of hundreds of volts) into an otherwise "clean" AC power line. Although these transient voltages are of short duration, they can show up in your computer's power supply and create havoc.

Many of the components in your computer are extremely sensitive to any sudden high voltage, which can "zap" your system and cause it to perform in strange ways. However, you may not notice these strange wonders for days and possibly weeks after the high voltage "zap" condition has passed! I had an IMSAI that suffered the voltage "Wrath of ZEUS," and bad IC components appeared daily for almost *three months afterward!* So track down these "glitch producers" and remove them from your system's power circuit.

Some small and innocent-looking appliances may also cause problems. Automatic heat-regulating soldering irons (often used next to a microcomputer) will "pop" the AC power line with voltage spikes that may not cause severe damage, but may cause erratic operation of your computer (e.g., bad disks or bad memory).

Transient voltage suppression devices are available to wire directly into the AC input of your microcomputer's power supply, or can be purchased "built-in" to a power outlet box. Be warned however, that they are limited in "trapping" various combinations of transient voltage, duration and frequency, and they are expensive. You are better off getting rid of trouble at the *source* rather than trying to rid your microcomputer of "glitches" after the fact.

Lightning strikes — from the incoming AC power line *and* from the telephone system — are an additional hazard to your microcomputer. If you are using a direct connect modem (such as the D.C. Hayes or PMMI modems), you would be wise to disconnect them during the onslaught of a really good lightning storm. I know of two systems in the midwest (Calamity Cliffs Computer Center, and Technical CBBS), that have had repeated "hits" on their systems, and each time literally destroyed the telephone couplers attached to their systems!

### *S-100 Buss Systems*

Many S-100 buss systems are especially prone to the localized "brown-out" effect, because the non-regulated (read "cheap to manufacture") power supply (which provides +8 VDC and +-16 VDC to the system's mother-board buss) is regulated separately on each board in the computer.

The individual boards regulate the +5 VDC, and +-12 VDC required by their integrated circuits and components. These regulators require (at a minimum) 3 volts of "head room" for proper operation (i.e., the on-board integrated circuits use +5 VDC and therefore require a "raw" input to the regulators of +8 VDC).

You can measure the voltage with a low cost voltmeter purchased from your local electronics or hardware store. Nothing fancy required — any meter in the $10 to $15 category will be fine. Refer to the manufacturer's details on the layout of each board for the regulator input/output (and ground) pin assignments, and follow the "three volt rule" to determine if your computer is being fed the proper diet of raw input voltage (measure *directly* at the INPUT and GROUND terminals).

Be aware that the DC voltage value may appear to be correct, but due to poor power supply filtering in your "raw" supply, may have an AC composite voltage (called a "ripple") that "droops" below the head-room required by the individual on-board voltage regulators. Again using your inexpensive voltmeter, switch to the lowest AC voltage range possible, and measure the input voltage once more.

Any measurable voltage means potential trouble, with the effect of "mini-brown-outs" every half-cycle of the AC line voltage (8.3 milliseconds for a 60 cycle input).

Keep in mind that your microcomputer will be executing instructions at the rate of millions per second. Eight milliseconds is a considerable amount of execution time to your system, and the system must *not screw up even once.* Murphy's Law of Frapped Program Execution states that "one bad instruction will modify *other* instructions (also known as The Avalanche Effect) and will *always* occur after four hours of editing a program, with *no* backup file!"

What can you do if you find trouble with the input power voltage? (1) Find an AC input line voltage source that is solid (i.e., really *is* 115 VAC), (2) purchase a pre-regulated (expensive) power source, or (3) *give up now!* There is no hope ahead for trouble free operation of your system, just frustration.

Note: some S-100 buss microcomputer systems (notably the MITS Altair 8800b computer) allowed the user to "tune" the unregulated power supply voltage by changing the power supply's transformer AC input voltage "taps" to boost the output voltage. This was done to accommodate the installation of additional boards (usually more than six) in the already power starved Altair. Check your system's hardware manual to see if it is possible to "tune" your system for a low line voltage situation.

A word of caution here: if the line voltage *does* recover and input more than nominal voltage, or you move the computer to some new location that has a solid line voltage, those same voltage regulators may have *too much* "head room" and must get rid of this extra input voltage in the form of *heat*. Computer components degrade drastically with any rise in temperature (beyond their normal power ratings), and will surely succumb to an early death. Watch out — onboard filter capacitors tend to turn into resistors at elevated temperatures and burst into flames (yes, *catch fire*). Of course, heat is another problem.

### *Keeping Your Microcomputer Cool*

Perhaps the worst offender in keeping component devices from running hot in your microcomputer is the cooling system itself, or lack of it. If you have a fan, the foam filters that cover the fan inlet are trying to provide not only cool air, but *clean* air. Dust and dirt has to go somewhere, so where else but the filter? That's where the crud stays.

If you're as (gulp) tidy as I am, you should do what I do: throw'em away! Sure, dirt and dust will be sucked into the computer, but if your fan is working properly, most of it will also be *blown out* It is much better to let the internals get a little dusty than to forget to remove and clean the filter once a month.

Alright, now you will always have cool air blowing into the microcomputer. But is the cool air cooling anything? With the cover off of your computer, light a match and blow it out, and immediately place it six to eight inches downstream from the incoming air flow. Where does the smoke go? On some systems, the smoke shows that the cooling air goes right out the vent holes next to the fan! If this is so with your system, block the vent holes with some duct tape and cardboard.

Try the smoke test again. Is the flow of air actually blowing *through* the boards in your system? If not, use more duct tape and cardboard and channel the airflow directly into the boards. It may not look very sophisticated, but once you put the cover back on, who'll notice?

You may have to be clever and design a good airflow system into your microcomputer. Cooling always seems to be an afterthought in many of the "boxes" that I have seen. The IMSAI 8080 chassis has the power transformer parked directly in front of the fan blocking the airflow. However, with a little work (and duct tape and cardboard), it runs pretty cool even with fifteen cards in the system. Another method to try, if the duct tape and cardboard is inadequate, is to un-bolt the fan, pull it out of the chassis, and put it in backwards to blow air through the system.

Some microcomputers rely on convection cooling alone to keep cool (e.g., Apple II, Osborne 01, etc.). If the temperature is warm on the outside, count on it being 10 to 20 degrees hotter on the inside. The point here is: keep the room that your microcomputer is in *cool* — about 70 degrees is comfortable for the internals. Avoid placing your system in a place where it gets direct sunlight, or if it's in a cabinet with additional peripheral parts of your system (especially disk drives), mount it *underneath* all that stuff (remember, hot air rises).

Also, keep your microcomputer clear of floor heat ducts. They may help keep your toes toasty on cold winter nights as you sit in front of your terminal, but they can cause heat damage to your computer.

### *Radiated Disaster: Sources and Situations*

You know about radiated *heat* doing nasty things, but have you considered all the potential sources (and types) of radiated energy that cause us computerists grief? Consider a telephone, such as the one you use with your modem to communicate with other systems. It seems to make a neat "bookend" to lean a stack of floppy disks against, right? *Wrong!!* The bell in Ma Bell's device is *magnetically driven.*

Read the back of one of the paper sleeves used to hold your floppy disks (What?? You *don't* keep them in their sleeves when you're not using them? Argh!). Even if you *don't like to read*, the graphics provide some pretty good clues. For example, see the giant magnet crossed out as dangerous? Your telephone has one inside it. (Why they put the "do's and don'ts" on the *back* of the floppy disk sleeve, I'll never know.)

Of course, the microcomputer itself is a good source of magnetic energy, especially if it is enclosed in a plastic case. Most of the magnetic energy comes from the transformer in the power supply. Keep your disks away from this area of your system.

Some computer terminals also radiate magnetic energy that is strong enough to erase a floppy disk. It is an extremely bad practice to lay floppy disks on top of your terminal. The terminal's fly-back transformer and CRT yoke can radiate enough energy to cause flakey disks.

One bizarre source of magnetic damage is the X-Ray machine at the airport. The x-rays themselves will not clobber a disk, but the magnetic field used to focus the x-rays sure will!

On the other hand, EPROM (Erasable Programmable Read Only Memory) components don't mind magnetic fields, but the x-rays are excellent for a quick erase job! Hand carry these items and don't allow them to be x-rayed. I mark my boxes of disks for mailing with "DO NOT X-RAY! MAGNETIC MEDIA INSIDE."

By the way, do you live near an airport or industrial area where radar is used? High energy pulses of power can travel many miles to clobber your system. You know when this is happening, because you can set your watch by the time sweep of the dish antenna that "blips" your system. Although this is a rare situation for most home environments, it does happen (twice to me so far!).

Finally, there is the all-too-familiar static discharge. You've felt it — that spark you create by casually rubbing your feet on the carpet before touching the keyboard? The sudden sickening "oh no" feeling when WordStar® just ... goes away?

If you can, place your microcomputer system in a room without rugs. Stay away from Nylon rugs! If that is not possible, place an anti-static mat in front of your system (where you sit), and also get a can of anti-static spray (the stuff you use to keep your clothes from clinging) and apply it liberally and as often as needed to the rug around your system. Also, office chairs on rolling rubber wheels make dandy generators of static electricity. They are safe if they roll on an anti-static mat, but dangerous to your system if they roll onto a rug.

Also, when working on some of the boards in your system (even if only to change addressing on a memory board), make sure that you do not give these boards a dishonorable discharge. Ground yourself out *prior to* yanking any boards from the system. Even discharging directly to the chassis of the system is better than through one of the computers boards (at least the discharge path is most likely to go back to the protective ground at the wall socket, *not* to some expensive components).

## *Confidence and Diagnostic Programs*

On a weekly basis I run a set of comprehensive diagnostics on my microcomputer system, just for the confidence I get from knowing that everything is still working properly. Many diagnostic programs are in the public domain (free for the asking from user group libraries and remote software exchanges).

However, be aware that there are few tests that are *really good and exhaustive memory tests.* Don't expect these tests to find anything but "dead-duck" RAM failures. The best memory test that I have seen (commercial or otherwise) is in the public domain SIG/M disks, volume 5: MEMDIAG.ASM and MEMDIAG.DOC (you may recognize the author's name).

Most disk tests are generally adequate for simple read/write confidence, but try to find one with lots of *random* seek operations during both read and write (head positioners go sour here).

By the way, the so-called *head cleaner* diskettes should not be used (unless your floppy disk drive manufacturer recommends one, which is highly doubtful). They can wear down a read/write head by tens of micro-inches in 30 seconds of use, as compared to one year of operation with the crappiest diskette you can find. Most diskettes cause "self-cleaning" anyway, and unless you have diskettes with visible burn-out (i.e., you can *see* through them), don't worry about it. Read/write heads are better left alone, especially the double sided type with tiny little spring gimbles that are *easily bent* — don't tamper!

A "poor man's disk test" is the nonstop use of the PIP command to copy files from one disk drive to another. Use PIP in a ".SUB" test file, and use SUBMIT to re-SUBMIT the ".SUB" test file itself (use CONTROL-B to end the "endless" submit operation). Try copying a lot of short files to perform the most mechanical (read/write head load and unload) operations possible, in conjunction with files scattered all over the diskette. This is usually adequate for a confidence test.

## *Program Backup and File Maintenance*

I cannot stress enough the importance of "backing-up" (copying) all programs and data files. The most important disks to save as backups (and never use) are the original disks you purchased for your system. These "master" disks are used only once: to make a master copy!

Check to see if the master disks are *write protected* before inserting them into your disk drive. Get the *best* floppy disks that money can buy, and make *three copies* of each master disk.

After the copy operation, identify each disk using the labels supplied; however, mark the labels *before* putting them on disks. Even a slight amount of pressure through the disk's jacket will cause damage to the thin oxide coating of the internal disk itself.

If you must write over a label already attached to a disk, use a felt-tip pen and apply very little pressure. *Do not* use ball-points or pencils!

Mark your disks as (1) "Master," (2) "Master Backup," and (3) "Working Copy." Date the working copy for future reference, in order to keep track of its use. My WordStar program disk gets a real workout, and I "retire" these overworked disks to the "scratch pile" after six months of heavy use.

*Don't use an eraser* to change the information on labels. Erasers tend to leave particles of abrasive rubber to float around the inside of the disk jacket. To change a label, carefully peel-off the old label and stick on a new one. Don't paste a new label over the top of an old one — on some floppy disk drives, this changes the dimensional characteristics of the disk, which may cause data to be recorded poorly.

File the master disk in a metal filing cabinet (or wherever you keep important documents), preferably in a room at the opposite end of your home or office (figuring that only *half* of your house may burn down). Do *not* store disks up high in a closet where it may get warm during the summer months.

Keep the "Master Backup" accessible, but also in a safe place (e.g., filing cabinet), and use your "Working Copy" for doing the things you bought a microcomputer to do in the first place.

Why three copies? Well, consider this: you're working late one evening, and *zap!* Your disk is clobbered. Hmmm, that's strange... So, you grab your (only?) available backup disk and, a minute later, *zap!* It is wiped out also! Some weird hardware failure got *both* of them!

You get the point: with a third copy, you still have your "Master" to go back to, once you have fixed the hardware problem (and not until!).

Archives are a very important part of disaster prevention and recovery. Although floppy disks are not cheap, consider your initial investment (consider the cost of WordStar for instance!). Also, consider the hours of work that you put into developing and debugging your program, or typing data into your data base, or composing paragraphs of your book. The retail cost of the floppy disk is a tiny fraction of its worth while it contains data.

To help minimize the cost of backing up software, there is a nice software package called Squeeze and Unsqueeze (actually SQ.COM and USQ.COM). The Squeeze and Unsqueeze programs save as much as 45% of the disk space occupied by a file. You guessed it — the Squeeze program squeezes the files on your disk by copying them into a "squeezed" format, to make room for more files on the disk (the originals are presumed to be on another disk). The Unsqueeze program copies "squeezed" files into the regular storage format (which takes up more room on the disk, so you would want to "unsqueeze" the files to another disk that can hold them).

The Squeeze and Unsqueeze programs (SQ.COM and USQ .COM) were written by Richard Greenlaw and placed in the public domain (thanks, Richard). You can find them on most RCPMs (Remote CP/M Systems). Call mine with your modem, and keep trying: CP/M-Net, 805-527-9321. Richard also wrote a program called TYPESQ (type-out squeezed files) that lets you unsqueeze the contents of a text file (document, source program or any simple ASCII file) quickly for display only (very useful for viewing lists of programs available on RCPM systems, since most large lists are in squeezed format). Richard also wrote a batch processing "parameter list builder" called FLS.

These and many other useful CP/M programs are available and free for the cost of a phone call. More public domain programs for CP/M systems are available from two user group software libraries (usually for the cost of an eight-inch disk plus mailing): CPMUG, 1651 Third Avenue, New York NY 10028, and the SIG/M, Box 97, Iselin, NJ 08830.

Here are four useful CP/M programs in the public domain:

CRCK.COM, written by Keith Peterson, generates Cyclic Redundancy Check (CRC) numbers for validation and verification of files on disk. You don't have to know the specific details of CRC numbers, just that a unique set of numbers is generated for each file you run with CRCK.COM. Before sending a file to another system, you run CRCK.COM on the file to get this unique number. After sending the file, the receiver runs CRCK.COM on the new copy to see if the unique number matches the first one. If the files are identical, they will match.

DU.COM, written by Ward Christensen, is a great "fixer-upper" for disks whose directory areas are scrambled or whose files were erased (even disks with which you performed an `ERA *.*`⏎). The features of the handy Disk Utility are too numerous to mention here, but this is program you *must* have for really good system maintenance and disaster recovery. For further details, refer to the *CP/M-Net News*, June 1981, Number 6, Volume 1, Issue 6 (available from the CP/M-Net RCPM system).

FILE-XT2.COM, written by yours truly, is useful for examining the detailed directory information on a CP/M 2.2 compatible disk (thanks, Kelly — the editors). This utility allows you recover all of the information required by CP/M to determine the file allocation and attributes of the individual files on a CP/M disk. This information is absolutely required (print a hard copy!) if you have to fix a scrambled CP/M disk directory at some later time.

FINDBAD.COM, written by Gene Cotton, will find bad sectors on a floppy disk, accumulate the groups holding the bad sectors, and write the bad group allocations to the disk directory as a file named [UNUSED] .BAD. Since the bad sectors are already allocated to a file, CP/M cannot use them for good files. I always use FINDBAD after formatting a pile of disks, to save me from the grief of bad sector errors when I'm working.

These programs (fully compatible with any floppy disk format using CP/M Version 2.2, eight-inch or five-inch) form part of my "standard" utility set that resides on my day-to-day "work disk."

### *Tidiness is Happiness*

A tidy computer is a happy computer. You learned this rule first-hand if you ever assembled your own microcomputer (either from "scratch" or in kit form), and carefully examined the interconnections of power supply wiring, the cabling to peripheral devices (printers, disk drives, terminal, etc.), looked for frayed wires and poor solder connections, discovered inadequate power handling capability, etc.

As you add additional boards to your microcomputer system, the ability of the power supply to provide the necessary power to the additional boards may be limited by the voltage drop across the wires trying to get power to those boards!

For example, I started out with six boards in my crusty old IMSAI computer. I added another, then another, and another, and soon I had used up most of the available 22 slot mother-board connectors and the original power supply just couldn't hack it.

I replaced the power supply

with a heavy duty supply (25 Amp/+8 VDC), but still couldn't get enough power into the mother-board because I used the original wiring. So, I got the heaviest gage wire I could find (10 AWG) and rewired the entire mother- board.

Let me tell you a secret about IMSAI S-100 mother-boards: wire the mother at *both ends* of the power distribution buss lines and use the shortest length wire path possible. This will guarantee that there is a minimum voltage drop not only in the cabling *to* the mother-board, but will minimize any voltage drop *across* the mother-board. While rewiring my system, I added a small 12 volt incandescent panel lamp across the power supply +8 VDC filter capacitor. Why? Consider that this filter capacitor is one heck of a storage battery for a considerable time after power is turned off. It may take as much as a minute for this capacitor to discharge, and during this minute you may be yanking or inserting another board into the mother-board... and *zap!!* Due to the clever pin assignments of the S-100 buss +8/+-16 power (and just the slightest amount of "skew" inserting or removing a board), you have "zorched" not only that board but probably *all* the other boards in the system! I use the panel lamp as a "power safe" indicator. It costs less than fifty cents, and can save hundreds of dollars in costly repair or replacement.

Also, make sure that all fuses are rated for the power your system is using. There are few things more disconcerting than to see the printed circuit board power etch "curled-up" on various boards in your system, because it was not properly "fused."

Re-inspect the power wiring from time-to-time and look for nicks or cuts in the insulation. This reminds me of the time I arc-welded my IMSAI to the top of my Sanyo Monitor — a splendid pyrotechnic display to be sure, all due to a tiny nick in the +8 VDC wiring to the chassis that developed from months of inserting and removing boards in the mother-board, and the fact that I had defeated the 3-wire AC power plug (chassis ground return) with one of those "handy-dandy" adaptor plugs... Argh!!

Finally, try to minimize contaminants from getting into your system. Smoking and food (and yes, beverages such as beer) will not do good things for your system (do as I say here, not as I do). Terminals with vent holes in the tops of the cabinets for cooling pose problems for people like me who see the cabinet as a nice place to set a cup of coffee, can of beer, etc. You can make a beautiful corona (ala the "aurora borealis") by spilling the coffee or beer inside the terminal.

A truly fascinating sight, but if the "arc'n-mit-shpark'n" doesn't blow your terminal (or microcomputer) up, the acid content will rot things out, or the carbon content (sugar) eventually will short things out. Soft drinks are especially bad for terminals and computers!

If you spill something inside the terminal or computer, *don't* wash it out with any kind of solvent other than *pure distilled water.* Let it dry thoroughly before applying power again. To date, my poor old IMSAI has consumed only one beer, and lived to tell about it. There was this cherry tomato, that (somehow) wound-up wedged down inside a power supply that months later, *phfft...* well, you get the picture!

## *Oh Yes... Recovery!*

Believe it or not, we are usually our worst enemy when it comes to causing problems with our microcomputers. CP/M is a fairly simple operating system, but there are times when we use its simple blind power to clobber a disk or two... or three! Remember, do not use your master program disks and backup data disks — with them intact, there is always hope.

However, there are those really dumb times (usually at late hours and provoked by too many cans of beer) that can really blow you into the weeds. I remember vividly the time I tried to copy 25 master disks for a friend, putting the blank disk in drive A and the master disk to be copied in drive B. Yes, you are right — I turned 25 master disks into blank disks!

Sometimes you learn the hard way. In such situations, the important thing to remember is *don't panic!* Unless there's a fire inside the chassis, *don't turn your system off* if you need to recover important work that is gently nestled within the RAM of your system. It's usually still there in RAM, unless you had a "brown-out" or stroke of lightning (I told you how to avoid them). The data needs to be cajoled out of RAM and stored on disk (or tape, or *anywhere* it can be saved).

When you're in the middle of a WordStar session (or whatever word processor you use), and the program "crashes," try this: re-boot your system (preferably with a known good disk), fire up DDT (the debugging program supplied with CP/M) or SID (a symbolic debugger from Digital Research), and start dumping memory to the terminal while searching for your edited text. It's in there someplace!

Note the beginning address of the text, and find the end of the text and note that also. Then use the DDT (or SID) ***H*** command to get the sum and difference, and note the number of pages (256 bytes/page). Now, move the whole section down to address 100 Hex with the ***M*** command, leave DDT or SID by typing a CONTROL-***C*** or the ***G0***⏎ command) and use the SAVE command to save the total number of pages you noted. You may not save all of your work, but you may save most of it!

Also, take advantage of the built-in facilities offered with text editors such as ED and WordStar. Save your current editing session on disk frequently (CONTROL-***H*** for ED; CONTROL-***K*** and then ***S*** for WordStar) when working on something important. Saving while working will save you from grief later on, and takes so little time to do, as compared to retyping the last two hours worth of work.

That's all for this installment. Keep 'em cool, tidy, and fed with power properly. Get some file and disk maintenance utilities from the library of public domain software. Don't panic. Use DDT or SID to recover data from RAM. Use the saving feature of your text editor or word processor *frequently.* And keep good backups!

CP/M is a registered trademark of Digital Research.
Wordstar is a trademark of MicroPro International.

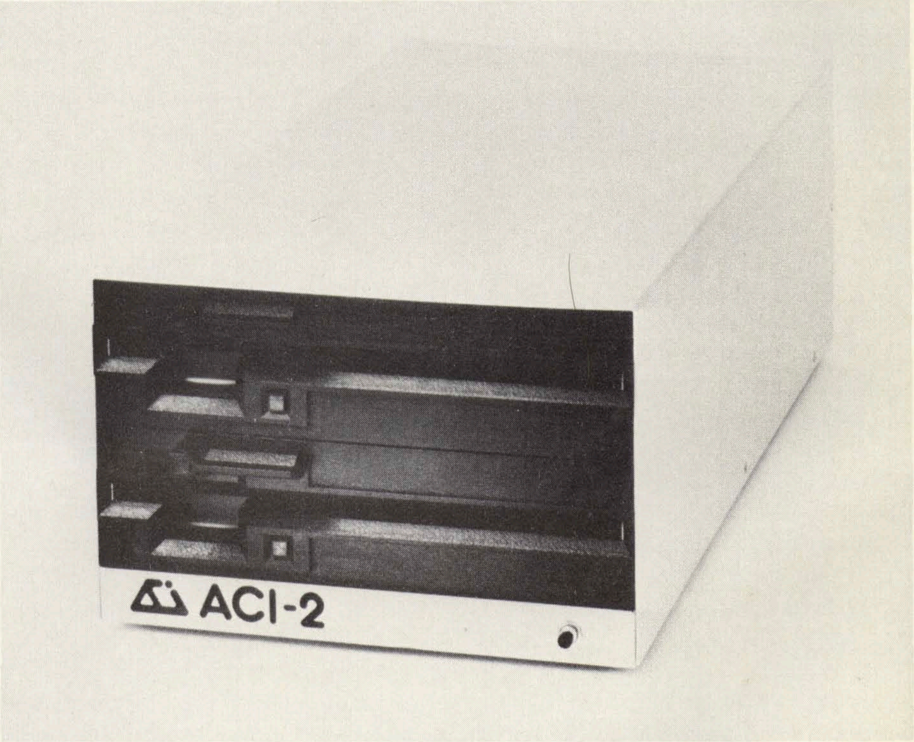
# The Alspa ACI Computer

## *An inexpensive single-drive system*

We've been using two Alspa ACI-1 computers in our editorial office for writing and editing purposes. The Alspa ACI-1 is a single-board computer tucked underneath a standard eight-inch floppy disk drive (ours each contain a Siemens drive). Each unit weighs only twenty lbs. (9" wide, 6" high and 18" deep), and lists for $1995 (for CP/M, add $150). You can attach any standard terminal (we chose the inexpensive ADDS Viewpoint 3A Plus for $550) and the computer is ready to use.

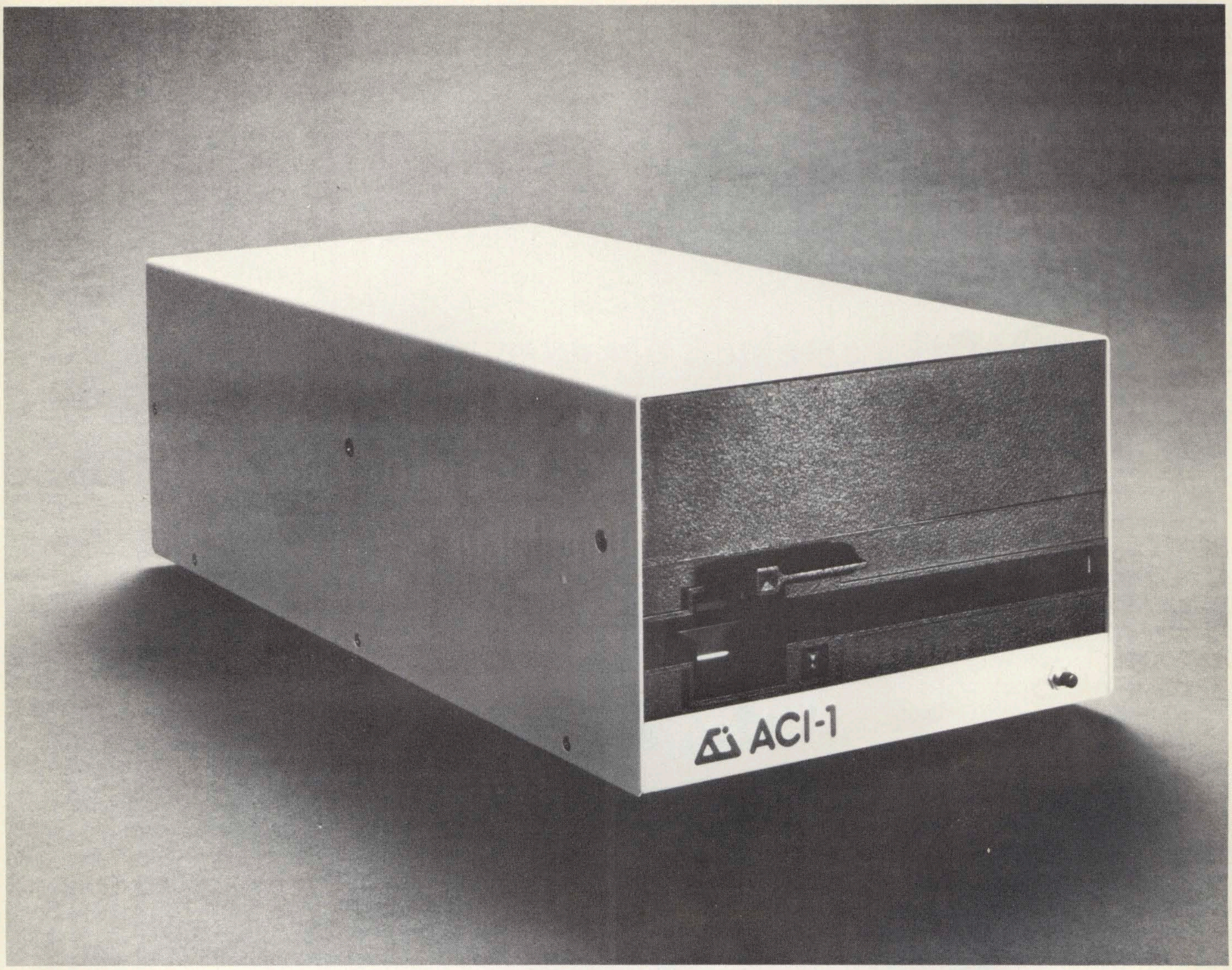
The Alspa is an interesting computer because it is the first *useful* single-drive CP/M system that we have found. Alspa provides a customized version of CP/M that lets you transfer files from one disk to another using only one disk drive. We had not previously seen a CP/M system that was useful in a single-drive configuration. We were surprised to find ourselves able to cope with the task of co-authoring and co- editing text files by using two single-drive Alspa computers that are far less expensive than the two double-drive computers we had previously used.

Put aside objections to limited disk space and consider these advantages:



- Your working disk contains the word processing program and your text files. No need to change "logged" disk.
- Your text file disks (on single density format, for archival storage) contain backups of text files.
- You can manage text files using different working disks for each project.
- Two users can share working disks, with each working disk representing a project such as a book, a set of related documents, or an issue of a magazine.
- End confusion about which files are the most recently updated ones. Since all updating occurs regularly, working disks always contain the most recent files.

Alspa provides a utility that combines the DIR and STAT displays: the D.COM program. Type ***D*** followed by RETURN, and the system displays all files in alphabetical order with their sizes (in increments of 1024 bytes) and the total amount of disk space used and free. You can also use the CP/M ambiguous filename matching symbols (******* and ***?***) with D.COM to display several files



and the sum of the space they occupy.

The Alspa ACI version of CP/M includes an FCOPY utility that facilitates copying from disk to disk. You can use the CP/M ambiguous filename matching symbols with FCOPY to copy several files at once, or to copy the entire disk. FCOPY can read any single-density eight-inch disk in the CP/M format, even text and data file disks used with other CP/M systems.

Alspa provides a very useful FORMAT program (FORM1K-.COM on our systems) that automatically creates a system disk and places D.COM on the disk. FORMAT lets you choose between the Alspa double-density single-sided format (600K per disk), the double-density double sided format (1200K per disk), or the standard CP/M single-density format (200K per disk).

You can also use FORMAT to copy system tracks of a system disk to another disk that has data on it, without disturbing the data. We use this feature to turn a a backup text file disk from another CP/M system into an Alspa system disk. The text files on the disk (placed there by another system) were never disturbed and were easily copied to other Alspa disks. Since FORMAT places the D.COM program on the disk to use to access its directory, you can use this feature to replace an old version of CP/M with a newer version.

Alspa provides the SYSTEM utility to configure its serial and parallel ports (we have only serial ports on our unit, but newer versions have an additional parallel port).

Alspa ACI systems are designed to allow easy interfacing to hard disk subsystems, especially the Corvus hard disk. Alspa has a version of CP/M that controls a Corvus hard disk to provide five megabytes (5,000K bytes) of on-line storage.

Alspa's version of CP/M includes the "AUTO-BOOT" ability to start the Alspa and run a program without the use of a terminal. With this feature, and space-saving durable box to hold the computer and disk drive, the Alspa is very useful in factory and control environments. We have found the Alspa to be a rugged and reliable CP/M system.

Alspa ACI systems are available from Alspa Computer, Inc., 300 Harvey West Blvd., Santa Cruz, CA 95060 USA (408-429-6000). ⌂

*Brief Looks At CP/M Systems...*

# The Osborne 01 Portable Computer

## *An inexpensive computer for everyone*

The Osborne 01®, at $1795 (including software), is the first affordable portable CP/M computer. Dubbed the "Volkswagen" of computers, The Osborne 01 is the first offering from Osborne Computer Corporation — the computer company founded by the outspoken Dr. Adam Osborne, a former columnist for *InfoWorld* and prolific author and publisher of computer books.

The Osborne 01 computer has a five-inch screen, a full- size alphanumeric typewriter-style keyboard with additional calculator-style numeric 12-key pad, two floppy disk drives, one serial RS-232 port, one modem port, and one parallel port, in a case the size of a portable sewing machine that fits under an airline seat and weighs under 25 pounds.

The Osborne 01 is supplied with CP/M®, WordStar® for word processing, MailMerge® for form letters and printing from mailing lists, SuperCalc® for calculating on spreadsheets, and both CBASIC® and MBASIC® for BASIC programming.

CP/M on the Osborne is enhanced with a HELP facility, disk COPY and XDIR utilities, and use of the "auto-start" feature of CP/M that automatically starts programs. The Osborne version of CP/M can run any CP/M program that can be installed for the Osborne 01 display screen.

The Osborne 01 screen is small for constant work and for viewing text files, and the standard disk drives (92K capacity) offer less disk space than most CP/M systems. However, the computer is so useful and inexpensive that no one complains. We find it useful for writing on the road and communicating with our office computer by phone.

Osborne Computer Corp. plans to make upgrades available, including double-density disk drives that will double the amount of storage space available on floppy disk. External large-screen monitors are available from nearly every Osborne dealer.

Without double-density drives you do not have a great amount of disk space compared to other, non-portable (and more expensive) systems. You have to plan your activities properly and use a lot of disks. As a stationary desktop computer, the Osborne 01 (without an add-on hard disk) lacks storage capacity for large applications like data base management; however, as a portable computer, the Osborne 01 offers complete CP/M capabilities at an outstanding price.

Application programs are supplied on separate disks. Each appication disk can be used as a system disk — the reserved system tracks of the disks are used for CP/M.

The idea is to use drive A as the system and application program disk, and use drive B as the disk to hold the new text files or data files you create with that application program. For example, to use WordStar, you insert your working copy of the system-/WordStar disk in drive A, and insert a WordStar text file disk in drive B. To use SuperCalc, you should replace your system/WordStar disk in drive A with a system/SuperCalc disk, and replace your text file disk in drive B with a SuperCalc data file disk.

To start using the Osborne 01, insert the disk containing the CP/M system programs and HELP utility into drive A, and follow the directions on your screen to press the RETURN key. The disk should start the HELP program automatically.

Each disk contains an automatic start-up program — a program that runs immediately after you start the system with that disk. For example, the WordStar disk automatically starts WordStar, the SuperCalc disk automatically starts SuperCalc, the CP/M HELP disk automatically starts the HELP facility, and the other CP/M disk automatically starts the XDIR command. (You can turn off this feature by renaming or deleting the disk's AUTOST.COM file.)

The XDIR utility combines information from the CP/M built-in DIR command (filenames) and information from the STAT system program (disk space and file sizes) to produce an alphabetized list of filenames with their sizes, and a bottom line reporting available disk space. (The XDIR.COM program is smaller than STAT.COM).

Osborne provides a COPY program that combines formatting and copying. You can copy an entire disk track by track to another disk (automatically formatting the other disk), or format a disk without copying. You can also execute COPY from one system disk, and have it copy the contents of another disk to a third disk (automatically formatting the third disk).

You can store only 92K bytes on each single density disk. We found that we could include the COPY.COM and XDIR.COM programs on each application disk to make them useful for checking disk size, filenames and file sizes (XDIR), and formatting or copying entire disks (COPY).

With XDIR.COM you don't need STAT.COM on every disk; with COPY.COM, you don't need PIP.COM on every disk. However, the standard PIP.COM is extremely useful for copying single or multiple files, or for copying to devices. The WordStar disk can still be useful without PIP.COM, since WordStar can copy files to other disks and can send files to the printer.

The Osborne 01 is designed to make anyone familiar with its application programs, and lists for $1795 (including software). Options are available (modem, larger external video monitor, and battery pack) as well as a library of CP/M software on Osborne disks.

The Osborne 01 is sold by dealers internationally. Contact Osborne Computer Corp., 26500 Corporate Ave., Hayward, CA 94545, USA for your local dealer.

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*Brief Looks At CP/M Systems...*

# The IBM Personal Computer

*Big Blue's version of CP/M-86*

IBM® provides a 16-bit version of CP/M® (CP/M-86®) for their new Personal Computer (PC). How does it differ from the eight-bit version of CP/M?

The obvious changes include a command to set the time and date (TOD command), a utility that copies an entire disk track by track (COPYDISK), and a HELP utility that displays helpful messages about any command. CP/M-86 on the PC lets you use function keys to view a disk directory or check the free space on disk. The system also provides two very useful commands, SPEED and PROTOCOL, to control nearly every aspect of serial data communications (using the PC's serial port).

The not-so-obvious change is the added capabilities of a 16-bit operating system designed for the 8086 or 8088 processors.

The advantages over CP/M-80 (the standard eight bit operating system) include the ability to handle the more advanced programs that will soon be offered for 16-bit systems. The IBM PC has a business configuration that can support the standard CP/M environment (64K) as well as grow to handle larger internal memory requirements (256K to 512K).

Files on CP/M-86 systems can be used in CP/M-80 systems; and files on CP/M-80 systems can be used with CP/M-86. However, CP/M-80 *programs* cannot be run in CP/M-86 systems, nor can CP/M-86 programs be used in a CP/M-80 system. CP/M-80 programs can be altered to work in CP/M-86 systems, but they cannot be put to work without some modifications. CP/M-86 utility programs ("transient commands") use the ".CMD" rather than ".COM" extension.

The PROTOCOL and SPEED commands let you make baud rate adjustments and change communication protocols. They simplify a problem that is traditionally complicated in CP/M and other systems, and let you use commands like TYPE directly with serial devices. PROTOCOL lets you select "no protocol" (for older or foreign devices), XON/XOFF, or ETX/ACK (two widely-used protocols).

You start CP/M on the PC by loading the disk in drive A and pressing CTRL-ALT-DEL (the CTRL, ALT and DEL keys simultaneously). CP/M on the PC includes the NEWDISK command to format disks. A formatted PC CP/M system disk (with no files except the system itself) has 141K of free space for utilities (".CMD" files), application programs and files.

The IBM PC's monochrome display has a higher resolution than most personal computer displays (7x9 dot characters within a 9x14 dot box). With the two disk drives (320K total), 64K internal memory and monochrome display, the PC costs $3600. CP/M-86 is an additional $250.

CP/M-86 is also available for the IBM Displaywriter. IBM Personal Computers and Displaywriters are on sale at IBM Product Centers throughout the U.S. CP/M-86 for the Displaywriter is available directly from Digital Research, P.O. Box 579, Pacific Grove, CA 93950 USA (408-649-3896).

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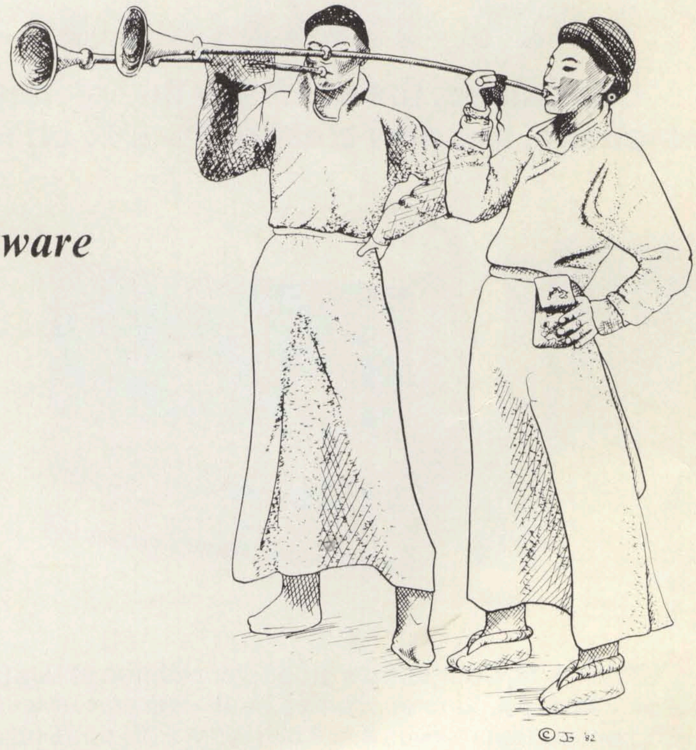
# The User's Guide™

## To CP/M® Systems and Software



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## Disk 2

CSC boards are qualified under the Certified System Component high-reliability program (200 hour burn-in, direct exchange program). CP/M and MP/M are trademarks of Digital Research; OASIS is a trademark of Phase 1. MP/M 8-16 is used under license from Digital Research.

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**8-16**

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